SELF INSTRUCTOR ON LUMBER SURVEYING.

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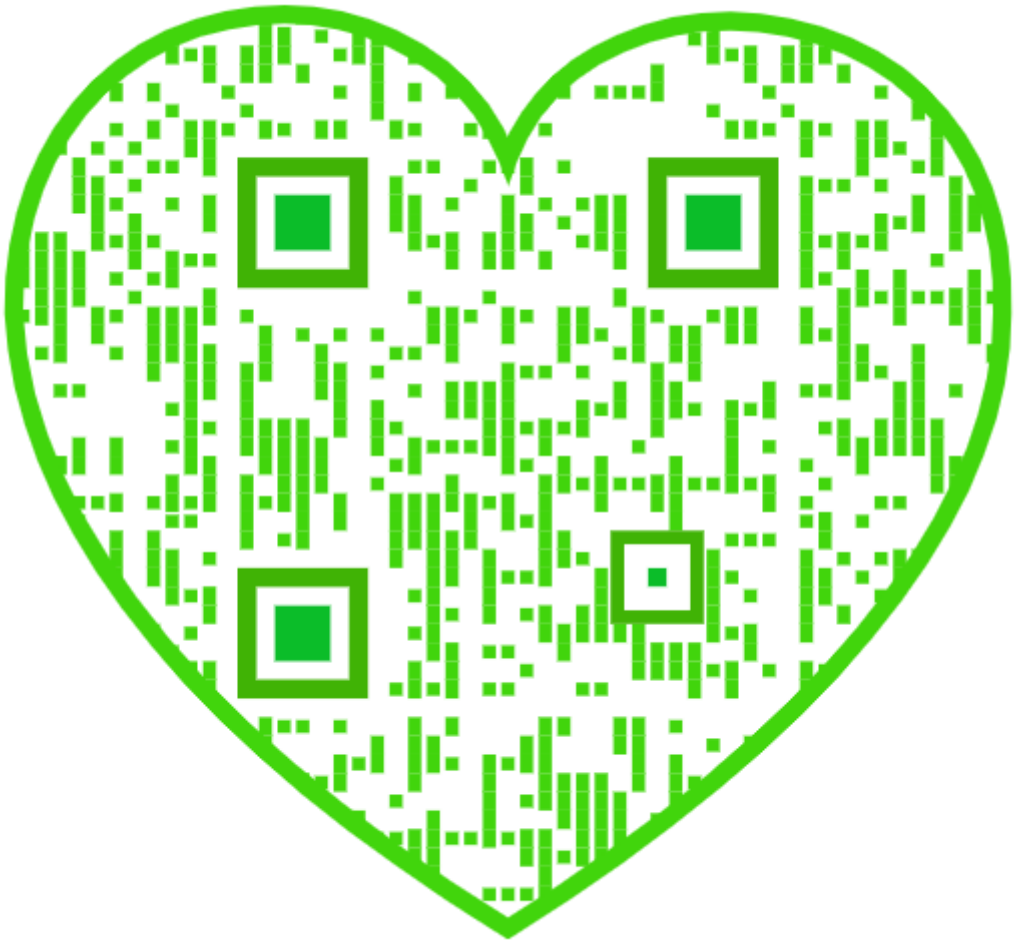

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SELF-INSTRUCTOR

ON

LUMBER SURVEYING,

FOR THE USE OF

LUMBER MANUFACTURERS, SURVEYORS, AND TEACHERS.

BY

CHARLES KINSLEY,

PRACTICAL SURVEYOR AND TEACHER OF SURVEYING.

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ASSIGNOR,

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CALAIS, ME., AND ST. STEPHEN, N. B.

1870.

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Entered according to Act of Congress, in the year 1870,
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RIVERSIDE, CAMBRIDGE:
ELECTROTYPED AND PRINTED BY
H. O. HOUGHTON AND COMPANY.

PREFACE.

THIS work combines the theoretical and practical parts of surveying, in such a manner as to enable the energetic and uninitiated student who applies himself to the study of this useful and interesting science for a short time, to survey all kinds of lumber with accuracy and expertness. It contains tables for measuring boards, plank, deal, and timber by board measure, by which the Surveyor can dispense with the use of the Board Rule. It contains the rules generally adopted by Surveyors, and also a more concise rule than that in general use: for plank, deal, and timber, this rule alone is worth more than the price of the book to any Surveyor, as it requires less mental calculation than by the other rules, enabling him to survey faster and with less trouble than he could otherwise do. It contains tables for inch, inch and a quarter, and inch and a half boards for battens and joist. It also contains rules and tables for surveying logs by board and cubic measure, and rules for ton timber. It also contains tables showing the number of feet in length, of any dimension, which will make 1,000 feet board measure or 1,000 feet cubic measure;

a new method of finding the solid contents of timber; a rule for finding what a round log will square, by having the circumference or diameter given, or in other words, to find the inscribed square; how to make out specifications, survey bills, etc.; rule for measuring tapering timber; table of quarter-girts for logs; rule for finding how much in length, of any dimension, which will make a solid foot, or any other desired quantity; table showing the weight of twenty-five kinds of wood, with a rule for finding the weight of the same from the contents; the English and American Government rules for finding the tonnage of vessels, and rules for gauging and ullaging casks. It also contains a correct and extensive interest table.

TABLE OF CONTENTS.

	Page
Rule for measuring Rectangular Boards	7
Exercise on the Rule	7
To find the Contents of a Triangular Board	8
Exercise on the Rule	8
To find the Solidity of a Sphere or Globe	9
To find the Contents of a Triangular Solid	9
To find the Superficial Contents of a Globe	9
To find the Contents of a Circular Board	9
Rule for finding the Contents of a Circle	9
Rule for finding the Diameter or Circumference of a Circle	9
Table for measuring Inch Boards, without a Board Rule, from Two Inches to Thirty-six Inches wide	10
Exercise on the Table	10
Table for measuring Inch-and-a-Quarter Boards without a Board Rule	11
Exercise on the Table	11
Table for Inch-and-a-Half Boards without using the Board Rule	12
Exercise on the Rule	12
Table for Plank from Two to Thirty Inches wide	13
Exercise on the Table	13
Table for Three-inch Deals from Three to Twenty-four Inches wide	14
Table for Four-inch Deals from Four to Twelve Inches wide	15
Table for Five-inch Timber from Five to Twelve Inches wide	16
Table for Six-inch Timber from Six to Twelve Inches wide	16
Table for Seven-inch Timber from Seven to Twelve Inches wide	17
Table for Eight-inch Timber from Eight to Twelve Inches wide	17
Table for Nine-inch Timber from Nine to Twelve Inches wide	17
Table for Ten-inch Timber from Ten to Twelve Inches wide	17
Table for Eleven-inch Timber from Eleven to Twelve Inches wide	17
Table for Twelve-inch Timber from Twelve to Twenty Inches wide	17
Plan of drawing a Plank Shingle, with Directions for dotting Plank, Deal, &c	18, 19
Rule for Plank Specifications	20
How to keep a Joist or Scantling Shingle	22
New York Deals, Three-inch	23
Specification Rule for Three-inch	24
Specification Rules for Four-inch	25, 26
Five-inch Timber Shingle, with Rule for Specification	28–30

Rule for Six-inch Specification 31
Rule for Seven-inch Specification 33
Rule for Eight-inch Specification 35
Rule for Nine-inch Specification 37
Rule for Ten-inch Specification 40
Rule for Eleven-inch Specification 41
Rule for Twelve-inch Specification 42
Rule for finding the Contents of Battens or Two-and-a-Half-inch Stuff 44
Specification of Batten Shingle and Rule 45
Random Shingle, Contents given in the Columns 45
Random Shingle, Running Lengths in the Columns 46
Table showing the Number of Feet in Length, of all Dimensions, that will make 1,000 feet of Board Measure 47
Table showing the Number of Feet in Length. of all Dimensions, from Five Inches by Five Inches to Twenty-two Inches by Twenty-Four Inches that will make 1,000 Cubic feet, with Rules showing how both Tables are computed 48
New Rules for finding the Contents in Cubic Feet of Timber, from Five by Five up 49
Second Method of making out Specification, and Rule 51, 52
Specification of Philadelphia Deal, and Rule 53, 54
How to use the Board Rule, with Exercise 54
Rule for measuring Logs, with Example 55
To find the Largest Square Piece of Timber that can be sawed from a Round Log, by having the Circumference or Diameter given . 56
Form of Bills of Lading 57, 58
Surveyor's Bills and Receipts 59
New Rules for finding the Superficial Contents of Plank, Deal, Joist, Battens, and Timber 59
Given the Dimensions of the End of a Plank to find what Length of it will make a Foot 61
To find the Solid Contents of a Piece of Tapering Timber 61
When a Board or Plank is wider at one End than the other, to find what Length of it will make a Foot, or any Desired Quantity . 62
To find how much in Length will make a Solid Foot, or any other Desired Quantity, of Squared Timber of Equal Dimensions from End to End 62
Table for measuring Round Timber by the Quarter-girt Areas . . 63
Table and Rule for finding the Weight of Timber from a Survey of its Contents 64
English Government Rule for finding the Tonnage of Vessels . . 65
United States Government rule for finding the Tonnage of Vessels . 66
Gauging of Casks 67
Ullaging of Casks 68
Questions for Exercise 69
Log Rule for Round Timber 72–76
Directions for using the Log Rule 77
Interest Table and Rule 77–79

SELF-INSTRUCTOR

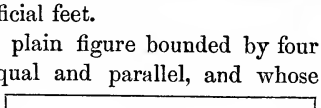
ON

LUMBER SURVEYING.

Rule for measuring Rectangular Boards.

Multiply the length in feet by the width in inches, and divide the product by 12, to find the contents in superficial feet. Or multiply the length in inches by the width in inches, and divide by 144, the number of inches in a square foot, for the contents in superficial feet.

P. S. — A Rectangle is a plain figure bounded by four straight lines, which are equal and parallel, and whose angles are right angles, as B.



QUESTIONS FOR EXERCISE.

1. What are the contents in feet of a rectangular board 30 feet long and 20 inches wide? *Ans.* 50 feet.

2. How many feet in a board 26 feet 6 inches long, 12 inches in width? *Ans.* $26\frac{1}{2}$ feet.

3. What will be the cost of a walnut board 32 feet long and 16 inches wide, at 8 cents per square foot. *Ans.* $3.41.

4. What are the contents of a board 22 feet 8 inches long, and 1 foot 9 inches in width? *Ans.* 39 feet 8 inches.

When a Board is wider at one End than at the other.

Rule. — Add the width of both ends together, and take half the sum for a mean width, and multiply the width thus found by the length, for the contents; or take the width in

the middle of the board and multiply by the length, for the contents.

EXAMPLE.

1. What are the contents of a board 14 inches at one end and 20 inches at the other, and 24 feet in length.

Ans. 34 feet.

$14 + 20 = 34 \div 2 = 17$, mean width in inches, which multiplied by the length, 24 feet $= 408$; $408 \div 12 = 34$ feet $=$ contents.

2. What are the contents of a board 26 feet long, which measures 16 inches in the middle? *Ans.* 34 feet 8 inches.

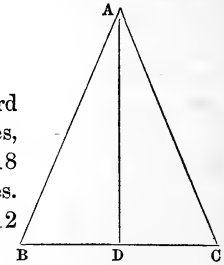
26 feet $\times$ 16 $= 416$; $416 \div 12 = 34$ feet 8 inches $=$ contents.

To find the Contents of a Triangular Board.

Rule. — Multiply the length in feet by the width in inches, and take half the sum for the contents in inches, which being divided by 12 will give the contents in feet of board measure.

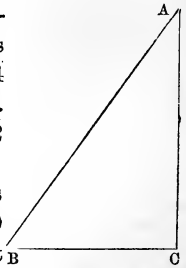
EXAMPLE.

1. What are the contents of the board A B C, whose base B C is 26 inches, and perpendicular height A D is 18 feet. *Ans.* 19 feet 6 inches.



$18 \times 26 = 468 \div \frac{1}{2} = 234 \div 12$ $= 19$ feet 6 inches.

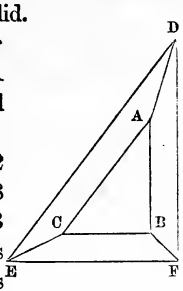
2. What are the contents of the triangular board A B C, whose base B C is 2 feet 6 inches, and perpendicular A C, 24 feet. *Ans.* 30 feet.



24 feet $\times 2\frac{1}{2} = 60$ feet; 60 feet $\div 2$ $= 30$ feet. Or —

2 feet 6 inches $= 30$ inches; 30 inches $\times$ 24 feet $= 720$ inches; $720 \div 2 = 360$ inches $=$ contents; $360 \div 12 = 30$ feet $=$ contents in feet.

The contents of a triangular solid can be found in the same manner by the foregoing rule, by multiplying the contents thus found by the thickness of the solid.

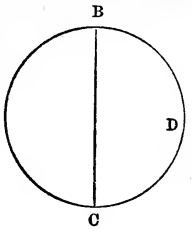


How many feet of boards in a triangular piece of timber, A B C, whose length A B is 24 feet, breadth B C 18 inches, and thickness C E 2 feet 6 inches?

24 feet × 18 inches = 432; 432 ÷ 2 = 216 inches; 216 inches ÷ 12 = 18 feet = contents of superficial triangle A B C, which being multiplied by the thickness C E, 2 feet 6 inches, will give the contents of the solid triangle A B C D E F, 18 feet × $2\frac{1}{2}$ feet = *Ans.* 45 cubic feet, or 540 board measure.

For Measurement of a Globe.

Rule. — To find the solidity of a globe, cube the diameter, and multiply the product by 5,236; and to find the surface of a globe, multiply the diameter by the circumference. To find the circumference by having the diameter given, say as 7 is to 22, so is the diameter to the circumference, or as 22 is to 7, so is the circumference to the diameter.



To find the Contents of a Circle.

Rule 1. — Multiply half the circumference by half the diameter, for the contents.

Rule 2. — Square the diameter, and multiply it by .7854 for the contents, or square the circumference, and multiply it by .07958 for the contents.

P. S. — The square of a number is found by multiplying the number by itself.

Table for measuring Inch Boards without a Rule, from 2 Inches to 36 Inches wide.

Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.
2 × 1 =	$\frac{1}{6}$	11 × 1 =	$1\frac{1}{12}$	20 × 1 =	$1\frac{2}{3}$	29 × 1 =	$2\frac{5}{12}$
3 × 1 =	$\frac{1}{4}$	12 × 1 =	1	21 × 1 =	$1\frac{3}{4}$	30 × 1 =	$2\frac{1}{2}$
4 × 1 =	$\frac{1}{3}$	13 × 1 =	$1\frac{1}{12}$	22 × 1 =	$1\frac{5}{6}$	31 × 1 =	$2\frac{7}{12}$
5 × 1 =	$\frac{5}{12}$	14 × 1 =	$1\frac{1}{6}$	23 × 1 =	$1\frac{11}{12}$	32 × 1 =	$2\frac{2}{3}$
6 × 1 =	$\frac{1}{2}$	15 × 1 =	$1\frac{1}{4}$	24 × 1 =	2	33 × 1 =	$2\frac{3}{4}$
7 × 1 =	$\frac{7}{12}$	16 × 1 =	$1\frac{1}{3}$	25 × 1 =	$2\frac{1}{12}$	34 × 1 =	$2\frac{5}{6}$
8 × 1 =	$\frac{2}{3}$	17 × 1 =	$1\frac{5}{12}$	26 × 1 =	$2\frac{1}{6}$	35 × 1 =	$2\frac{11}{12}$
9 × 1 =	$\frac{3}{4}$	18 × 1 =	$1\frac{1}{2}$	27 × 1 =	$2\frac{1}{4}$	36 × 1 =	3
10 × 1 =	$\frac{5}{6}$	19 × 1 =	$1\frac{7}{12}$	28 × 1 =	$2\frac{1}{3}$		

In order to survey boards by the Table of Board Measure, the Surveyor must commit the table to memory, and by a little practice, he will become expert at surveying by this method.

Questions for Exercise done by the Table of Board Measure.

1. What are the contents of a board 24 feet long and 18 inches wide? *Ans.* 24 × $1\frac{1}{2}$ = 36 feet.

2. How many feet in a board 32 feet long and 17 inches wide? *Ans.* $45\frac{1}{3}$ feet.

By the table, 17 inches wide is $1\frac{5}{12}$ the length, for the contents; therefore 32 feet × $1\frac{5}{12}$ = $45\frac{1}{3}$ feet.

3. What are the contents of a board 21 feet 6 inches long and 6 inches wide? *Ans.* 10 feet 9 inches.

By the table, 6 inches wide is half the length, for the contents; therefore 21 feet 6 inches ÷ 2 = 10 feet 9 inches = contents.

4. Required the contents of a board 36 feet long and 3 inches wide? *Ans.* 36 ÷ 4 = 9 feet.

5. Find the contents of a board 24 feet 8 inches long and 14 inches wide?

Ans. 24 feet 8 inches × $1\frac{1}{6}$ = 28 feet 9 inches 4″.

6. Required the contents of a board 27 feet long and 30 inches wide? *Ans.* $67\frac{1}{2}$ feet.

7. What is the value of a walnut board 23 feet 6 inches long, and 36 inches wide, @ $12\frac{1}{2}$ cents per square foot? *Ans.* $\$8.81\frac{1}{2}$.

8. Required the contents of a board 16 feet long and 27 inches wide? *Ans.* 36 feet.

9. How many feet in a board 38 feet long and 28 inches wide? *Ans.* 88 feet 8 inches.

10. Required the contents of a board 16 feet long and 19 inches in width? *Ans.* 25 feet 4 inches.

Table for Inch-and-a-Quarter Boards, from 2 Inches to 36 Inches wide.

Inches.	Feet.	Inches.	Feet.	Inches.	Feet.
$2 \times 1\frac{1}{4}$	$= \frac{5}{24}$	$14 \times 1\frac{1}{4}$	$= 1\frac{11}{24}$	$26 \times 1\frac{1}{4}$	$= 2\frac{17}{24}$
$3 \times 1\frac{1}{4}$	$= \frac{5}{16}$	$15 \times 1\frac{1}{4}$	$= 1\frac{9}{16}$	$27 \times 1\frac{1}{4}$	$= 2\frac{13}{16}$
$4 \times 1\frac{1}{4}$	$= \frac{5}{12}$	$16 \times 1\frac{1}{4}$	$= 1\frac{2}{3}$	$28 \times 1\frac{1}{4}$	$= 2\frac{11}{12}$
$5 \times 1\frac{1}{4}$	$= \frac{25}{48}$	$17 \times 1\frac{1}{4}$	$= 1\frac{37}{48}$	$29 \times 1\frac{1}{4}$	$= 3\frac{1}{48}$
$6 \times 1\frac{1}{4}$	$= \frac{5}{8}$	$18 \times 1\frac{1}{4}$	$= 1\frac{7}{8}$	$30 \times 1\frac{1}{4}$	$= 3\frac{1}{8}$
$7 \times 1\frac{1}{4}$	$= \frac{35}{48}$	$19 \times 1\frac{1}{4}$	$= 1\frac{47}{48}$	$31 \times 1\frac{1}{4}$	$= 3\frac{11}{48}$
$8 \times 1\frac{1}{4}$	$= \frac{5}{6}$	$20 \times 1\frac{1}{4}$	$= 2\frac{1}{12}$	$32 \times 1\frac{1}{4}$	$= 3\frac{1}{3}$
$9 \times 1\frac{1}{4}$	$= \frac{45}{48}$	$21 \times 1\frac{1}{4}$	$= 2\frac{9}{48}$	$33 \times 1\frac{1}{4}$	$- 3\frac{7}{16}$
$10 \times 1\frac{1}{4}$	$= 1\frac{1}{24}$	$22 \times 1\frac{1}{4}$	$= 2\frac{7}{24}$	$34 \times 1\frac{1}{4}$	$= 3\frac{13}{24}$
$11 \times 1\frac{1}{4}$	$= 1\frac{7}{48}$	$23 \times 1\frac{1}{4}$	$= 2\frac{19}{48}$	$35 \times 1\frac{1}{4}$	$= 3\frac{31}{48}$
$12 \times 1\frac{1}{4}$	$= 1\frac{1}{4}$	$24 \times 1\frac{1}{4}$	$= 2\frac{1}{2}$	$36 \times 1\frac{1}{4}$	$= 3\frac{3}{4}$
$13 \times 1\frac{1}{4}$	$= 1\frac{17}{48}$	$25 \times 1\frac{1}{4}$	$= 2\frac{29}{48}$		

Examples of $1\frac{1}{4}$-inch Board Measure done by the Table.

1. What are the contents of a board $1\frac{1}{4}$ inches thick, 32 inches wide, and 30 feet long? *Ans.* 100 feet.

By the table 32 inches is $3\frac{1}{3}$ times the length; for the contents, therefore, 30 feet $\times 3\frac{1}{3} = 100$ feet.

2. What are the contents of a board $1\frac{1}{4}$ inches by 18 inches, and 36 feet in length? *Ans.* 67 feet 6 inches.

3. Required the contents of a board $1\frac{1}{4}$ inches by 24 inches, and 32 feet 8 inches in length?

Ans. 81 feet 8 inches.

4. How many feet in a $1\frac{1}{4}$-inch board 16 inches wide and 24 feet long? *Ans.* 40 feet.

5. What will be the cost of a piece of mahogany $1\frac{1}{4}$ inches by 12 inches, and 36 feet long, @ 6 cents per foot?

Ans. $2.70.

Table for One-and-a-Half-inch Boards, from 2 to 24 Inches wide.

Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.
$2 \times 1\frac{1}{2} =$	$\frac{1}{4}$	$8 \times 1\frac{1}{2} =$	1	$14 \times 1\frac{1}{2} =$	$1\frac{3}{4}$	$20 \times 1\frac{1}{2} =$	$2\frac{1}{2}$
$3 \times 1\frac{1}{2} =$	$\frac{3}{8}$	$9 \times 1\frac{1}{2} =$	$1\frac{1}{8}$	$15 \times 1\frac{1}{2} =$	$1\frac{7}{8}$	$21 \times 1\frac{1}{2} =$	$2\frac{5}{8}$
$4 \times 1\frac{1}{2} =$	$\frac{1}{2}$	$10 \times 1\frac{1}{2} =$	$1\frac{1}{4}$	$16 \times 1\frac{1}{2} =$	2	$22 \times 1\frac{1}{2} =$	$2\frac{3}{4}$
$5 \times 1\frac{1}{2} =$	$\frac{5}{8}$	$11 \times 1\frac{1}{2} =$	$1\frac{3}{8}$	$17 \times 1\frac{1}{2} =$	$2\frac{1}{8}$	$23 \times 1\frac{1}{2} =$	$2\frac{7}{8}$
$6 \times 1\frac{1}{2} =$	$\frac{3}{4}$	$12 \times 1\frac{1}{2} =$	$1\frac{1}{2}$	$18 \times 1\frac{1}{2} =$	$2\frac{1}{4}$	$24 \times 1\frac{1}{2} =$	3*
$7 \times 1\frac{1}{2} =$	$\frac{7}{8}$	$13 \times 1\frac{1}{2} =$	$1\frac{5}{8}$	$19 \times 1\frac{1}{2} =$	$2\frac{3}{8}$		

1. What are the contents of a $1\frac{1}{2}$-inch board 32 feet long and 24 inches wide? *Ans.* 32 feet $\times$ 3 feet $=$ 96 feet.

2. Required the contents of a $1\frac{1}{2}$-inch board 18 feet long and 18 inches wide? *Ans.* $40\frac{1}{2}$ feet.

3. Find the contents of a board $1\frac{1}{2} \times 10$ inches and 28 feet 8 inches in length? *Ans.* 35 feet 10 inches,

By the table $1\frac{1}{2} \times 10$ is $1\frac{1}{4}$ the length, for the contents. 28 feet 8 inches $\times$ $1\frac{1}{4} =$ 35 feet 10 inches.

4. What are the contents of a board 24 feet long, 20 inches wide, and $1\frac{1}{2}$ inches thick? *Ans.* 60 feet.

5. Required the contents of a board 16 inches wide, $1\frac{1}{2}$ inches thick, and 27 feet long. *Ans.* 54 feet.

6. What is the value of a board 17 inches wide, and $1\frac{1}{2}$ inches thick, and 20 feet long, at 6 cents per foot?

Ans. $2.55.

* Equal three times the length, for contents.

Table for Two-inch or Plank, from 2 to 30 Inches wide.

Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.
$2 \times 2 =$	$\frac{1}{3}$	$2 \times 10 =$	$1\frac{2}{3}$	$2 \times 17 =$	$2\frac{5}{6}$	$2 \times 24 =$	4
$2 \times 3 =$	$\frac{1}{2}$	$2 \times 11 =$	$1\frac{5}{6}$	$2 \times 18 =$	3	$2 \times 25 =$	$4\frac{1}{6}$
$2 \times 4 =$	$\frac{2}{3}$	$2 \times 12 =$	2	$2 \times 19 =$	$3\frac{1}{6}$	$2 \times 26 =$	$4\frac{1}{3}$
$2 \times 5 =$	$\frac{5}{6}$	$2 \times 13 =$	$2\frac{1}{6}$	$2 \times 20 =$	$3\frac{1}{3}$	$2 \times 27 =$	$4\frac{1}{2}$
$2 \times 6 =$	1	$2 \times 14 =$	$2\frac{1}{3}$	$2 \times 21 =$	$3\frac{1}{2}$	$2 \times 28 =$	$4\frac{2}{3}$
$2 \times 7 =$	$1\frac{1}{6}$	$2 \times 15 =$	$2\frac{1}{2}$	$2 \times 22 =$	$3\frac{2}{3}$	$2 \times 29 =$	$4\frac{5}{6}$
$2 \times 8 =$	$1\frac{1}{3}$	$2 \times 16 =$	$2\frac{2}{3}$	$2 \times 23 =$	$3\frac{5}{6}$	$2 \times 30 =$	5
$2 \times 9 =$	$1\frac{1}{2}$						

EXERCISE.

1. Required the contents of a plank 18 feet long and 15 inches in width? *Ans.* 45 feet.

By the table 15 inches wide is $2\frac{1}{2}$ times the length, for the contents in feet of board measure; therefore 18 feet $\times$ $2\frac{1}{2}$ $=$ 45 feet.

2. Required the contents of a plank 36 feet long and 12 inches wide at one end, and 16 inches at the other end? *Ans.* 84 feet.

12 inches $+$ 16 inches $=$ 28 inches; 28 inches $\div$ 2 $=$ mean width 14 inches. By the table 14 inches is $2\frac{1}{3}$ times the length; therefore 36 feet $\times$ $2\frac{1}{3} = 84$ feet.

3. What is the value of a plank 24 feet long and 27 inches wide @ $3\frac{1}{2}$ cents per foot? *Ans.* \$3.92.

4. Required the contents of a plank 18 feet long and 4 inches wide? *Ans.* $\frac{18}{1} \times \frac{2}{3} = \frac{36}{3} = 12$ feet.

5. What are the contents of 1,860 feet running lengths of 2 inches $\times$ 2 inches? *Ans.* 620 feet.

Solution. — 1,860 $\div$ $\frac{1}{3} = 620$ feet.

6. In 2,500 feet running lengths how many feet contents of 2 inches $\times$ 12 inches? *Ans.* 5,000 feet or 5 M.

2,500 feet $\times$ 2 $=$ 5,000 feet, or 5 M.

Table for Three-inch Deals, from 3 to 24 inches wide.

Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.
3 × 3	= $\frac{3}{4}$	3 × 9	= $2\frac{1}{4}$	3 × 15	= $3\frac{3}{4}$	3 × 20	= 5
3 × 4	= 1	3 × 10	= $2\frac{1}{2}$	3 × 16	= 4	3 × 21	= $5\frac{1}{4}$
3 × 5	= $1\frac{1}{4}$	3 × 11	= $2\frac{3}{4}$	3 × 17	= $4\frac{1}{4}$	3 × 22	= $5\frac{1}{2}$
3 × 6	= $1\frac{1}{2}$	3 × 12	= 3	3 × 18	= $4\frac{1}{2}$	3 × 23	= $5\frac{3}{4}$
3 × 7	= $1\frac{3}{4}$	3 × 13	= $3\frac{1}{4}$	3 × 19	= $4\frac{3}{4}$	3 × 24	= 6
3 × 8	= 2	3 × 14	= $3\frac{1}{2}$				

EXERCISE.

1. What are the contents of a deal 3 inches thick, 6 inches wide, and 30 feet long? *Ans.* 45 feet.

By the table 3 × 6 is $1\frac{1}{2}$ times the length, for the contents; therefore 30 feet × $1\frac{1}{2}$ = 45 = contents.

2. What are the contents of a deal 3 inches × 12 inches and $33\frac{1}{3}$ feet long? *Ans.* 100 feet.

3. In 2,700 feet of running lengths of 3 inches × 20 inches, how many feet? *Ans.* 13,500 feet.

By the table 3 × 20 is 5 times the length, for the contents; 2,700 × 5 = 13,500 feet.

4. Required the number of feet running lengths of 3 × 4 that will be equal to 2,000 feet running lengths of 3 inches × 10 inches? *Ans.* 5,000 feet.

5. What number of feet of running lengths of 2 × 3 will be equivalent to 24,000 feet running lengths of 3 × 12 inches. *Ans.* 144,000 feet.

Solution. — By the table 3 × 12 is 3 times the length, for the contents; therefore 24,000 feet × 3 = 72,000 feet = contents of 3 × 12 inches, and by the table 2 × 3 is = to half the length, for the contents; therefore 2 × 3 is 2 times the contents for the running lengths, consequently 72,000 feet × 2 = 144,000 feet running length.

Table for Four-inch Deals, from 4 to 12 Inches wide.

Inches. Feet.	Inches. Feet.	Inches. Feet.	Inches. Feet.
$4 \times 4 = 1\frac{1}{3}$	$4 \times 7 = 2\frac{1}{3}$	$4 \times 9 = 3$	$4 \times 11 = 3\frac{2}{3}$
$4 \times 5 = 1\frac{2}{3}$	$4 \times 8 = 2\frac{2}{3}$	$4 \times 10 = 3\frac{1}{3}$	$4 \times 12 = 4$
$4 \times 6 = 2$			

EXERCISE.

1. What are the contents of a deal 4×4 inches, and 20 feet long? *Ans.* $26\frac{2}{3}$ feet.

2. What are the contents of a deal 4×5 and 24 feet long? *Ans.* 40 feet.

3. Required the contents of a deal 4×6 and 26 feet long? *Ans.* 52 feet.

4. Required the contents of a deal 4 inches $\times$ 12 inches and 30 feet long? *Ans.* 120 feet.

5. What is the value of a piece of oak 36 feet long, 4 inches thick, and 11 inches wide, @ $4\frac{1}{2}$ cents per square foot?

6. In 2,800 feet of running lengths of 4 inches $\times$ 12 inches, how many feet of superficial measurement are there? *Ans.* 11,200 feet.

7. How many feet running lengths of 4 inches $\times$ 12 inches deals are equal to 3,000 feet running lengths of 2×6? *Ans.* 750 feet.

8. What is the amount of lumber in the following cargo, and its value @ $15.00 per M?

Surveyed from Bennett & Co., of Boston, Mass., to Ship Aurora, Capt. Jones, —

2,758 pieces 2×8 and 16 feet long.
3,800 pieces 4×12 and 30 feet long.
2,600 pieces 4×10 and 16 feet long.
250 M of Mer. spruce laths @ $2.50 per M.

Ans. 653,497 feet of lumber. 250 M laths.

Value of lumber, $9,802.45\frac{1}{2}$
Value of laths, 625.00

$10,427.45\frac{1}{2}$

Table of Five-inch Timber, from 5 to 12 Inches wide.

Inches. Feet.	Inches. Feet.
$5 \times 5 = 2\frac{1}{12}$	$5 \times 9 = 3\frac{3}{4}$
$5 \times 6 = 2\frac{1}{2}$	$5 \times 10 = 4\frac{1}{6}$
$5 \times 7 = 2\frac{11}{12}$	$5 \times 11 = 4\frac{7}{12}$
$5 \times 8 = 3\frac{1}{3}$	$5 \times 12 = 5$

Table of Six-inch Timber, from 6 to 12 Inches wide.

Inches. Feet.	Inches. Feet.
$6 \times 6 = 3$	$6 \times 10 = 5$
$6 \times 7 = 3\frac{1}{2}$	$6 \times 11 = 5\frac{1}{2}$
$6 \times 8 = 4$	$6 \times 12 = 6$
$6 \times 9 = 4\frac{1}{2}$	

EXERCISE.

1. What are the contents of a piece of timber 5 inches $\times$ 5 inches and 24 feet long? *Ans.* 50 feet.

By the table 5×5 is $2\frac{1}{2}$ times the length, for the contents; therefore 24 feet $\times 2\frac{1}{12} = \frac{24}{1} \times \frac{25}{12} = \frac{600}{12} = 50$ feet in board measure.

2. Required the contents of a joist 5×8 and 30 feet long? 30 feet $\times 3\frac{1}{3} = 100$ feet. *Ans.* 100 feet.

3. Find the contents of a beam 6 inches $\times$ 8 inches and 36 feet in length? *Ans.* 144 feet.

36 feet $\times 4 = 144$ feet.

4. How many running feet of 6-inch $\times$ 8-inch timber are equal to 3,500 feet running lengths of 5×12 inches? *Ans.* 4,375 feet.

By the table 5×12 is 5 times the length, for the contents, and $6 \times 8 = 4$ times the length; therefore 3,500 feet $\times 5 = 17{,}500$ feet $=$ contents of 5×12; then $17{,}500 \div 4 = 4{,}375$ feet $=$ the number of feet in length of $6 \times 8 = 3{,}500$ feet of 5×12.

5. What will a beam cost 48 feet long, 6 inches by 11 inches, @ $3\frac{1}{2}$ cents per foot? *Ans.* $9.24.

$48 \times 5\frac{1}{2}$ feet $= 264$ feet $=$ contents; $264 \times 3\frac{1}{2}$ cents $=$ $9.24.

Table of Timber from 7×7 *to* 12×20.

Seven-inch Timber.	Eight-inch Timber.	Nine-inch Timber.
Inches. Feet.	Inches. Feet.	Inches. Feet.
$7 \times 7 = 4\frac{1}{12}$	$8 \times 8 = 5\frac{1}{3}$	$9 \times 9 = 6\frac{3}{4}$
$7 \times 8 = 4\frac{2}{3}$	$8 \times 9 = 6$	$9 \times 10 = 7\frac{1}{2}$
$7 \times 9 = 5\frac{1}{4}$	$8 \times 10 = 6\frac{2}{3}$	$9 \times 11 = 8\frac{1}{4}$
$7 \times 10 = 5\frac{5}{6}$	$8 \times 11 = 7\frac{1}{3}$	$9 \times 12 = 9$
$7 \times 11 = 6\frac{5}{12}$	$8 \times 12 = 8$	
$7 \times 12 = 7$		

Ten-inch Timber.	Eleven-inch Timber.	Twelve-inch Timber.
Inches. Feet.	Inches. Feet.	Inches. Feet.
$10 \times 10 = 8\frac{1}{3}$	$11 \times 11 = 10\frac{1}{12}$	$12 \times 12 = 12$
$10 \times 11 = 9\frac{1}{6}$	$11 \times 12 = 11$	$12 \times 14 = 14$
$10 \times 12 = 10$		$12 \times 16 = 16$
		$12 \times 18 = 18$
		$12 \times 20 = 20$

1. What are the contents of a piece of timber 12 by 12 inches and 30 feet long? *Ans.* 360 feet.

2. What are the contents of a beam 7 inches by 9 inches and 30 feet long? *Ans.* $157\frac{1}{2}$ feet.

3. Required the contents of a piece of timber 9×10 inches and 40 feet long? *Ans.* 300 feet.

By the table $9 \times 10 = 7\frac{1}{2}$ times the length; 40 feet $\times 7\frac{1}{2}$ $= 300$ feet.

4. In 2,500 feet contents of 9×10, how many feet running lengths of 9×10, and of 11 by 12?

Ans. Of 11×12, $227\frac{3}{11}$ feet. Of 9×10, $333\frac{1}{3}$ feet.

5. What is the cost of 2,000 feet running lengths of 12-

inch by 20-inch timber @ 3 cents per foot of board measure? *Ans.* $1,200.00.

6. Required the contents of a piece of pine timber 8 inches by 12 inches and 24 feet long? *Ans.* 192 feet.

7. What is the difference in feet of board measure between 2,000 feet running lengths of 9 × 12 and 2,000 feet running lengths of 12 × 12?

Ans. 12 × 12 is 6,000 feet more.

By the table 12 × 12 = 12 times the length, and 9 × 12 = 9 times; therefore 12 — 9 = 3 feet difference; 2,000 × 3 = 6,000 feet difference.

Example showing the Manner of Drawing or Ruling a Shingle for Plank or 2-inch, also the Mode of Dotting.

Rule. — Take a shingle and rule it, as shingle No. 1 is ruled, the dimensions along the top column, and the lengths down the side column; then take a pencil and make a dot, thus (.), for every plank, or deal, or piece of timber, as the case may be. Suppose I want to dot a 2 × 6, 22 feet long, 3 times, I run along the top column of dimensions till I come to 2 × 6; I then go down said line till I come opposite 22 in the column of lengths, I then make three dots, thus (...). Then when I have finished dotting, I count all the dots, and place the figures as in the above shingle; those figures I afterwards transfer to my specification, in order to find the contents of the whole quantity of pieces I have dotted.

P. S. — You can, if required, rule your shingle so as to include any length or dimension, and most shingles are drawn as shingle No 1 is.

Plank Shingle, No. 1.

Lengths. Dimensions.	2 × 3	2 × 4	2 × 5	2 × 6	2 × 7	2 × 8	2 × 9	2 × 10	2 × 11	2 × 12
12	18	4	10	15	9	2	12	6	5	4
13	9	5	5	5	7	6	8	8	2	1
14		4	4		2	5	6		9	2
15	2	5	1	5	2			5	4	
16	5	3	10	2		8	2	4	4	10
17			6			5		10		
18		12			25		3	2	5	5
19	3	4	5	2	1	4	4	3	1	6
20	15	3			4	2	1	2	16	4
21	10	2	1	7	4	2	1	2	1	7
22	9	4	4	3		3	3		2	6

Example of Specification of the Plank Shingle No. 1, *showing the manner of finding the Contents.*

Rule. — One sixth of the length of 2-inch stuff multiplied by the width will give the contents in feet of board measure or superficial feet.

Specification of Plank Shingle No. 1.

Lengths. Dimensions.	2 × 3	2 × 4	2 × 5	2 × 6	2 × 7	2 × 8	2 × 9	2 × 10	2 × 11	2 × 12	Contents.
12	18	4	10	15	9	2	12	6	5	4	1,120
13	9	5	5	5	7	6	8	8	2	1	834
14		4	4		2	5	6		9	2	623
15	2	5	1	5	2			5	4		422
16	5	3	10	2		8	2	4	4	10	1,000
17			6			5		10			482
18		12			25		3	2	5	5	1,155
19	3	4	5	2	1	4	4	3	1	6	792
20	15	3			4	2	1	2	16	4	1,180
21	10	2	1	7	4	2	1	2	1	7	885
22	9	4	4	3		3	3		2	6	828
											Total, 9,321 feet.

Rule for calculating a 2-Inch or Plank Specification.

Multiply the number of pieces or dots in each square of the table by the width of said pieces, and the product by $\frac{1}{6}$ of the length for the contents.

To find the Contents of Specification Shingle, No. 1.

Multiply the number of pieces in each square of the table, opposite the first length, 12 feet, by the widths of the different numbers of said pieces, and then by $\frac{1}{6}$ of the length for the contents; thus, for the first column running parallel to the top of the shingle,

Breadth.	3	4	5	6	7	8	9	10	11	12
No. Pieces.	18	4	10	15	9	2	12	6	5	4
	54	16	50	90	63	16	108	60	55	48

Then add all the products, $54 + 16 + 50 + 90 + 63 + 16 + 108 + 60 + 55 + 48 = 560$. Then 12, the length, $\div 6 = 2$ feet, $560 \times 2 = 1{,}120 =$ contents of the first column. Thus proceed until the contents of all the columns are found, then add the whole together for the total contents of the shingle.

P. S. — In this treatise, when there is a fraction of half a foot over, it is called a foot; when less than half a foot, nothing.

For Joist or Scantling.

Take the running lengths of the different dimensions and mark down every 100 feet, then add up your shingle, and multiply the different sums by the multiplier of each dimension, as found in the tables for the contents of each. Hemlock joist is generally computed by this plan.

Joist Shingle.

2×3	$2\frac{1}{2} \times 3$	2×4	$2\frac{1}{2} \times 4$	$2\frac{1}{4} \times 3$	$2\frac{1}{4} \times 4$	3×4
100	100	10	100	100	100	250
100	100	90	100	100	100	250
100	100	100	100	100	100	100
50	100	100	100	100	100	100
200	100	100	100	100	100	100
100	150	100	100	100		100
100	100	100	100	100		
25	100	100	100	100		
150	100	100	100			
200	50	100	100			
100		100				
613	625	667	833	450	375	900*

* The numbers at the foot of the columns are feet of board measure.

3 inches by 4 inches by the table is once the length, therefore there are 900 feet of 3×4 contents. There are in the joist shingle 500 feet running length of $2\frac{1}{4} \times 4$, and $2\frac{1}{4} \times 4$ is $= \frac{3}{4}$ times the length; therefore, $500 \div \frac{3}{4} =$ to 375 feet $=$ contents of $2\frac{1}{4} \times 4$. There are 800 feet running lengths of $2\frac{1}{4} \times 3$, and $2\frac{1}{4} \times 3$ is $\frac{9}{16}$ times the length; therefore, $800 \div \frac{9}{16} = 450 =$ contents. There are 1,000 feet of $2\frac{1}{2} \times 4$; therefore, as $2\frac{1}{2} \times 4$ is $\frac{5}{6}$ of the length, the contents will be equal to $1{,}000 \div \frac{5}{6} = 833$ feet. Of 2 inches $\times$ 4 inches, 1,000 feet, which divided by $\frac{2}{3}$, will be the contents $= 667$ feet. Of $2\frac{1}{2} \times 3$ there are 1,000 feet, and $2\frac{1}{2} \times 3$ is $= \frac{5}{8}$ times the length; therefore, $1{,}000 \div \frac{5}{8} = 625$ feet. Of 2×3 there are 1,225 feet running lengths, and 2×3 is $\frac{1}{2}$ the length; therefore, $1{,}225 \div \frac{1}{2} = 612\frac{1}{2}$ feet.

New York Deal Shingle, 3-Inch, No. 2.

Lengths. Dimensions.	3 × 6	3 × 7	3 × 8	3 × 9	3 × 10	3 × 11	3 × 12
14	24	14	20	16	18	20	30
15	36	20	30	11	5	3	4
16	12		6	8	10	1	7
17		9	24	15	15	16	27
18	26	8	5	9	8	7	10
19	21	12	3	2	1	7	4
20	12	12	4	3	4	4	10
21		16	27	4	4	4	5
22	8	4	3	5	4	3	12
23	27		20	24	3	7	20
24		15	4	4	8	4	4
25	6	10	4	4	3	9	8
26	5	10	10	9	20	4	6
27	10	9	4	5	4	5	4
28		18	4	5	4	4	5
29	30	11	9	12	5		10
30	24	20	8	5	4	21	9

P. S. — New York deal is from 12 feet up in length, and from 6 to 12 inches wide, and must be good spruce lumber, free from cracks, rots, or large knots, etc.

Specification of New York Deal Shingle, No. 2.

Lengths. Dimensions.	3 × 6	3 × 7	3 × 8	3 × 9	3 × 10	3 × 11	3 × 12	Contents.
14	24	14	20	16	18	20	30	4,571
15	36	20	30	11	5	3	4	3,098
16	12		6	8	10	1	7	1,548
17		9	24	15	15	16	27	4,420
18	26	8	5	9	8	7	10	2,744
19	21	12	3	2	1	7	4	1,838
20	12	12	4	3	4	4	10	2,095
21		16	27	4	4	4	5	2,667
22	8	4	3	5	4	3	12	1,991
23	27		20	24	3	7	20	5,089
24		15	4	4	8	4	4	2,070
25	6	10	4	4	3	9	8	2,494
26	5	10	10	9	20	4	6	3,750
27	10	9	4	5	4	5	4	2,315
28		18	4	5	4	4	5	2,429
29	30	11	9	12	5		10	4,401
30	24	20	8	5	4	21	9	5,790

Rule for finding the Contents of 3-Inch Deals.

Multiply $\frac{1}{4}$ of the length of the deals by the breadth of them, for the contents.

This shingle is done the same way as the plank shingle No. 1, excepting that $\frac{1}{4}$ of the lengths are taken instead of $\frac{1}{6}$ of them.

New York Deal Shingle, 4-Inch, No. 3.

Lengths. Dimensions.	4 × 6	4 × 7	4 × 8	4 × 9	4 × 10	4 × 11	4 × 12
14	32	10	30	12	14	17	5
15	24	10	11		10	16	21
16	4	7	4	5	5	4	13
17	9		7	11	18	14	24
18	7	2	1	4	3	5	4
19	7	4	4	4	10		5
20	8	6		3	2	10	12
21	25		8	4	6	5	4
22		6	7	7	9	12	11
23	8	3	2	3	1	2	3
24	6	4	5	3	3	11	6

Rule for finding the Contents of 4-Inch Deals.

Multiply the length divided by 3 by the breadth for the contents in feet of board measure.

What are the contents of 32 pieces 14 feet long and 4×6? $32 \times 14 = 448$ feet of running length, then $14 \div 3 = 4\frac{2}{3} = \frac{1}{3}$ of length of each piece. And 4×6 inches by the table is $= 2$ times the length, for the contents, therefore $448 \times 2 = 896$ feet $=$ contents. By taking $\frac{1}{3}$ of the length, it is done thus, 32 pieces $\times$ 6, their breadth $= 192 \times 4\frac{2}{3} = 896$ feet, contents. Or multiply the number of pieces by the length of one, and the product by $\frac{1}{3}$ of the width of the deals for the contents of 4-inch.

Specification of New York Deal Shingle, 4-Inch, No. 3.

Lengths.	Dimensions.	4 × 6	4 × 7	4 × 8	4 × 9	4 × 10	4 × 11	4 × 12	Contents.
14		32	10	30	12	14	17	5	4,653
15		24	10	11		10	16	21	4,150
16		4	7	4	5	5	4	13	2,133
17		9		7	11	18	14	24	4,709
18		7	2	1	4	3	5	4	1,398
19		7	4	4	4	10		5	1,887
20		8	6		3	2	10	12	2,607
21		25		8	4	6	5	4	2,891
22			6	7	7	9	12	11	3,777
23		8	3	2	3	1	2	3	1,380
24		6	4	5	3	3	11	6	2,832
									Total, 32,417 feet.

Solution of Specification No. 3.

No.	Br.	Products.
32	6	192
10	7	70
5	12	60
30	8	240
12	9	108
14	10	140
17	11	187
		997
14 ÷	3 =	$4\frac{2}{3}$
Contents,		4,653

No.	Br.	Products.
24	6	144
10	7	70
11	8	88
10	10	100
16	11	176
21	12	252
		830
15 ÷	3 =	5
Contents,		4,150

No.	Br.	Products.
4	6	24
7	7	49
4	8	32
5	9	45
5	10	50
4	11	44
12	13	156
		400
16 ÷	3 =	$5\frac{1}{3}$
Contents,		2,133

No.	Br.	Products.
9	6	54
8	7	56
11	9	99
18	10	180
14	11	154
24	12	288
		831
17 ÷	3 =	$5\frac{2}{3}$
Contents,		4,709

No.	Br.	Products.
7	6	42
2	7	14
1	8	8
4	9	36
3	10	30
5	11	55
4	12	48
		233
18 ÷	3 =	6
Contents,		1,398

No.	Br.	Products.
7	6	42
4	7	28
4	8	32
4	9	36
10	10	100
5	12	60
		298
19 ÷	3 =	$6\frac{1}{3}$
Contents,		1,887

No.	Br.	Products.
8	6	48
6	7	42
3	9	27
2	10	20
10	11	110
12	12	144
		391
20 ÷	3 =	$6\frac{2}{3}$
Contents,		2,607

No.	Br.	Products.
25	6	150
8	8	64
4	9	36
6	10	60
5	11	55
4	12	48
		413
21 ÷	3 =	7
Contents,		2,891

No.	Br.	Products.
6	7	42
7	8	56
7	9	63
9	10	90
12	11	132
11	12	132
		515
22 ÷	3 =	$7\frac{1}{3}$
Contents,		3,777

Solution of Specification No. 3. — (Continued.)

No.	Br.	Products.	No.	Br.	Products.	
8	× 6 =	48	6	× 6 =	36	24 feet being the length of the pieces in the last column, I take the $\frac{1}{3}$ of it = 8, and multiply it by the product of the No. of pieces and their breadths.
3	× 7 =	21	4	× 7 =	28	
2	× 8 =	16	5	× 8 =	40	
3	× 9 =	27	3	× 9 =	27	
1	× 10 =	10	3	× 10 =	30	
2	× 11 =	22	11	× 11 =	121	
3	× 12 =	36	6	× 12 =	72	
		180			354	
23	÷ 3 =	$7\frac{2}{3}$	24	÷ 3 =	8	
Contents,		1,380	Contents,		2,832	

Rule for computing 5-inch Timber.

Multiply the number of pieces in each square of the shingle, by their width as given in the top column, and the product by the length divided by $2\frac{2}{5}$ for the contents.

By multiplying the length of a 5-inch stick by the width of the same, and the product by the length divided by $2\frac{2}{5}$, you will get the contents in feet of Board Measure.

Required the contents of 33 pieces 10 feet long of 5 × 5.

1*st Solution.* — $33 \times 10 = 330 \times 2\frac{1}{12} = 687\frac{1}{2}$ feet.

2*d Solution.* — Find the contents of 10 pieces 33 feet long and 5 by 5. $10 \times 5 = 50$, $33 \div 2\frac{2}{5} = \frac{5}{12} \times \frac{33}{1} = \frac{165}{12} = 13\frac{3}{4}$, therefore $50 \times 13\frac{3}{4} = 687\frac{1}{2}$ = Ans.

Timber Shingle Five-inch, No. 4.

Lengths. Dimensions.	5 × 5	5 × 6	5 × 7	5 × 8	5 × 9	5 × 10	5 × 11	5 × 12
20	7	2	5	16	2	1	5	5
21	8	6	5	8	5	5	4	4
22	6	5	5	2	3	5	5	5
23		6	2	5	5	8	2	8
24	20	7	3	8	3	3	15	9
25	2	1	1	2	4		4	5
26	7	3	2	1	4	4	2	1
30		12	6	3	3	10	3	2
31	7	5	3	3	3	3	6	9
32		7	3	2	4	3	2	1
33	10	4	2	1	3	3	5	9

Specification of Five-inch Timber Shingle, No. 4.

Lengths. / Dimensions.	5 × 5	5 × 6	5 × 7	5 × 8	5 × 9	5 × 10	5 × 11	5 × 12	Contents.
20	7	2	5	16	2	1	5	5	2,941
21	8	6	5	8	5	5	4	4	3,167
22	6	5	5	2	3	5	5	5	2,778
23		6	2	5	5	8	2	8	3,191
24	20	7	3	8	3	3	15	9	5,570
25	2	1	1	2	4		4	5	1,865
26	7	3	2	1	4	4	2	1	2,004
30		12	6	3	3	10	3	2	4,025
31	7	5	3	3	3	3	6	9	4,405
32		7	3	2	4	3	2	1	2,387
33	10	4	2	1	3	3	5	9	4,345
									Total, 36,678 feet.

Example, showing how to compute a 5-inch Specification.

No. Br.	No. Br.	No. Br.	No. Br.
7 × 5 = 35	8 × 5 = 40	6 × 5 = 30	6 × 6 = 36
2 × 6 = 12	6 × 6 = 36	5 × 6 = 30	2 × 7 = 14
5 × 7 = 35	5 × 7 = 35	5 × 7 = 35	5 × 8 = 40
8 × 16 = 128	8 × 8 = 64	2 × 8 = 16	5 × 9 = 45
2 × 9 = 18	5 × 9 = 45	3 × 9 = 27	8 × 10 = 80
1 × 10 = 10	5 × 10 = 50	5 × 10 = 50	2 × 11 = 22
5 × 11 = 55	4 × 11 = 44	5 × 11 = 55	8 × 12 = 96
5 × 12 = 60	4 × 12 = 48	5 × 12 = 60	
353	362	303	333
*20 ÷ $2\frac{2}{5}$ = $8\frac{1}{3}$	21 ÷ $2\frac{2}{5}$ = $8\frac{3}{4}$	22 ÷ $2\frac{2}{5}$ = $9\frac{1}{6}$	23 ÷ $2\frac{2}{5}$ = $9\frac{7}{12}$
Contents, 2,941	Contents, 3,167	Contents, 2,778	Contents, 3,191

* 20 feet, the length of the pieces, divided by $2\frac{2}{5}$, and the result, $8\frac{1}{3}$, multiplied by 353 = 2,941 feet = contents of 20 ft pieces.

Invert $\frac{2}{5} = \frac{5}{12} \times \frac{20}{1} = \frac{100}{12} = 8\frac{1}{3}$

Timber Shingle, Six-inch, No. 5.

Lengths. Dimensions.	6 × 6	6 × 7	6 × 8	6 × 9	6 × 10	6 × 11	6 × 12
20	18	3	3	10	5	10	14
21		7	7	4	5	9	26
22	7	6	6	5	10	11	15
23	7	5	3	6	11	22	15
24		3	4	4	3	3	5
25	9		6	5	4	10	20
26	7	3	4	5	4	11	14
27	3	3	5	5	6	10	14
28	10	3	4	4	5	6	6
29	7	6	4	5	9	3	5
30	7	4	2	6	5	5	6

Rule for finding the Contents of 6*-inch Timber.*

Multiply the number of pieces or dots by the width of said pieces, and then multiply the product by half the length of one of the pieces, for the contents.

What are the contents of 18 pieces of 6 × 6, and 20 feet long? 18 × 6 = 108; 20 ÷ 2 = 10, 108 × 10 = 1,080 feet. By the Table 6 × 6 is three times the length for the contents, therefore 20 × 18 = 360 feet running length, 360 feet × 3 feet = 1,080. *Ans.* 1,080.

So we find the same result by both rules.

Specification of Timber Shingle, No. 5.

Lengths. Dimensions.	6 × 6	6 × 7	6 × 8	6 × 9	6 × 10	6 × 11	6 × 12	Contents.
20	18	3	3	10	5	10	14	5,710
21		7	7	4	5	9	26	6,321
22	7	6	6	5	10	11	15	6,358
23	7	5	3	6	11	22	15	7,900
24		3	4	4	3	3	5	2,544
25	9		6	5	4	10	20	6,712
26	7	3	4	5	4	11	14	6,097
27	3	3	5	5	6	10	14	6,237
28	10	3	4	4	5	6	6	4,718
29	7	6	4	5	9	3	5	4,988
30	7	4	2	6	5	5	6	4,755
								Total, 62,340 feet.

Examples showing how to compute the Specification No. 5 of 6-inch Timber.

Br. No.	Br. No.	Br. No.	Br. No.
6 × 18 = 108	7 × 7 = 49	6 × 7 = 42	7 × 6 = 42
7 × 3 = 21	8 × 7 = 56	7 × 6 = 42	7 × 5 = 35
8 × 3 = 24	9 × 4 = 36	8 × 6 = 48	8 × 3 = 24
9 × 10 = 90	10 × 5 = 50	9 × 5 = 45	9 × 6 = 54
10 × 5 = 50	11 × 9 = 99	10 × 10 = 100	10 × 11 = 110
11 × 10 = 110	12 × 26 = 312	11 × 11 = 121	11 × 22 = 242
12 × 14 = 168		12 × 15 = 180	12 × 15 = 180
571	602	578	687
20 ÷ 2 = 10	21 ÷ 2 = 10½	22 ÷ 2 = 11	23 ÷ 2 = 11½
Contents, 5,710	Contents, 6,321	Contents, 6,358	Contents, 7,900

What is the cost of a piece of pine timber 6 inches $\times$ 10 inches, and 38 feet in length @ $3\frac{1}{2}$ cts. per foot?

Ans. \$6.65.

Solution. — Length 38 $\div$ 2 = 19; 19 $\times$ by the breadth 10 = 190 feet, contents. 190 feet @ $3\frac{1}{2}$ = \$6.65.

By the Second Rule. 6 inches $\times$ 10 inches = 5 times the length, for the contents, therefore 38 $\times$ 5 = 190 feet. 190 feet $\times$ $3\frac{1}{2}$ cts. = \$6.65.

Rule for finding the Contents of 7-inch Timber.

Multiply the width by the length, divided by $1\frac{5}{7}$.

Required the contents of a piece of timber 7 $\times$ 7 and 20 feet long?

Divide the length, 20 feet, by $1\frac{5}{7}$ ($20 \div 1\frac{5}{7} = 11\frac{2}{3}$), and multiply the breadth, 7 inches, by the quotient, $11\frac{2}{3}$.

$11\frac{2}{3} = \frac{35}{3}$; $\frac{35}{3} \times \frac{7}{1} = \frac{245}{3} = 81\frac{2}{3}$ feet = contents in superficial feet.

2d Operation. — By the table 7 $\times$ 7 is = to $4_{1}1_{2}$ times the length, for the contents, therefore 20 feet $\times$ $4_{1}1_{2} = 81\frac{2}{3}$ feet = contents.

Timber is often surveyed and the contents marked on each piece, and then put down on a shingle for contents in its proper column.

Timber Shingle, Seven-inch. No. 6, and Specification.

Lengths. / Dimensions.	7 × 7	7 × 8	7 × 9	7 × 10	7 × 11	7 × 12	Contents.
20	24	16	7	5	18	16	9,321
21	9	6	8	7	8	6	5,059
22	4	4	4	6	8	8	10,062
23	9	4	7	7	18	27	10,062
24	21	7	8	6	9	8	7,420
25		4	5	6	6	4	3,807
26	14	2		6	5	5	1,493
27	5	6	4	5	7	7	5,197
28	8	4	4	7	8	4	5,390
29	15	7	7	4	6	2	5,988
30	8	4	5	8	7	8	6,755
31	16	12	4	2	1	3	5,624

Timber Shingle, Eight-inch. No. 7.

Lengths. Dimensions.	8 × 8	8 × 9	8 × 10	8 × 11	8 × 12
26	12	18	12	9	7
27	5	5	3	3	8
28	2	3	6	5	4
29	5	4	3	7	5
30	10	3	2	10	8
31		5	2	2	8
32	4	1	2	3	4
33	5	4	5	7	7
34	3	2	6	5	2
35		5	3	9	
36	12	6		7	9
37	15	7	24	21	32

Rule for finding the Contents of 8 *by* 8 *Timber.*

Divide the length by $1\frac{1}{2}$, and multiply the quotient by the width of the timber for the contents in feet of board measure.

EXAMPLE showing how the first column of 8-inch specification is done.

Br. No. pieces each 26 feet long.

$8 \times 12 = 96$
$9 \times 18 = 162$
$10 \times 12 = 120$
$11 \times 9 = 99$
$12 \times 7 = 84$

561

$26 \div 1\frac{1}{2} = 14$

2244
561

7854 feet = contents.

$26 \div 1\frac{1}{2} = \frac{3}{2}$.
Invert the divisor,
$\frac{2}{3} \times \frac{26}{1} = \frac{52}{3} = 14$.

Specification Shingle, Eight-inch. No. 7.

Lengths. Dimensions.	8 × 8	8 × 9	8 × 10	8 × 11	8 × 12	Contents.
26	12	18	12	9	7	7,854
27	5	5	3	3	8	4,392
28	2	3	6	5	4	3,845
29	5	4	3	7	5	4,698
30	10	3	2	10	8	6,660
31		5	2	2	8	3,782
32	4	1	2	3	4	3,029
33	5	4	5	7	7	6,314
34	3	2	6	5	2	4,103
35		5	3	9		4,060
36	12	6		7	9	8,040
37	15	7	24	21	32	38,406
						Total, 9,5183 feet.

Timber Shingle, Nine-inch. No. 8.

Lengths. / Dimensions.	9 × 9	9 × 10	9 × 11	9 × 12
26	 6	 14	 6	 5
27	 18	 12	 5	 5
28	.. 2	... 3	 4	.. 2
29	 4	... 3	.. 2	 4
30		 6	.. 2	 5
31	 8	... 3	 4	 4
32	 5	 4	.. 2	 15
33	.. 2	. 1	 5	... 3
34	.. 2	.. 2	 4	... 3
35	.. 2	 4	 5	 5
36	 6	.. 2	. 1	... 3

Rule for finding the Contents of Nine-inch Timber.

Divide the length by $1\frac{1}{3}$ and multiply the quotient by the breadth of the stick for the contents.

Required the contents of a piece of timber 9 × 12 inches and 26 feet long?

$26 \div 1\frac{1}{3} = 19\frac{1}{2}$. $19\frac{1}{2} \times 12 = 234 =$ contents.

Timber Shingle, Ten-inch. No. 9.

Lengths. / Dimensions.	10 × 10	10 × 11	10 × 12
26	36	13	5
27	4	5	4
28	11	5	11
29	8	3	4
30	4	6	4
31	6	2	1
32	27	3	3
33	5	5	5
34	3	2	6
35	1	2	5
36	12	25	24

Specification of Timber Shingle, Nine-inch. No. 8.

Lengths. Dimensions.	9 × 9	9 × 10	9 × 11	9 × 12	Contents.
26	6	14	6	5	6,240
27	18	12	5	5	8,039
28	2	3	4	2	2,436
29	4	3	2	4	2,958
30		6	2	5	3,195
31	8	3	4	4	4,510
32	5	4	2	15	6,888
33	2	1	5	3	2,945
34	2	2	4	3	3,009
35	2	4	5	5	4,541
36	6	2	1	3	3,267
					Contents, 48,028 feet.

Specification of Timber Shingle, Ten-inch. No. 9.

Lengths. Dimensions.	10 × 10	10 × 11	10 × 12	Contents.
26	36	13	5	12,198
27	4	5	4	3,297
28	11	5	11	6,930
29	8	3	4	3,891
30	4	6	4	3,850
31	6	2	1	2,428
32	27	3	3	9,040
33	5	5	5	4,587
34	3	2	6	3,513
35	1	2	5	2,683
36	12	25	24	20,490
				Contents, 72,907 feet.

Rule for Ten-inch Timber.

Divide the length by $1\frac{1}{5}$ and multiply the quotient by the breadth, for the contents in feet of board measure.

Required the contents of a stick 36 feet long 10 inches by 11 inches?

$36 \div 1\frac{1}{5} = 30$, and $30 \times 11 = 330$ feet = contents.

2d Solution. — By the table 10×11 is $9\frac{1}{6}$ times the length, for the contents; therefore, 36 feet $\times\ 9\frac{1}{6} = 330$ feet = contents.

EXAMPLES showing how 9 and 10 inch specifications are made out.

Nine-inch.

Br.	Pieces.	Pro.
9 ×	6 =	54
10 ×	14 =	140
11 ×	6 =	66
12 ×	5 =	60
		320
26 ÷ $1\frac{1}{3}$ =		$19\frac{1}{2}$
		2880
		320
		160
		6240

Contents = 6240

Length, $26 \div 1\frac{1}{3}$; $1\frac{1}{3} = \frac{4}{3}$. Inverted = $\frac{3}{4}$; $\frac{3}{4} \times \frac{26}{1}$ = $\frac{78}{4} = 19\frac{1}{2}$.

Ten-inch.

Br.	Pieces.	Pro.
10 ×	36 =	360
11 ×	13 =	143
12 ×	5 =	60
		563
		2
		3)1126
		375

563

$21\frac{2}{3}$

563

1126

375

12,198 feet

Length, $26 \div 1\frac{1}{5}$; $1\frac{1}{5} = \frac{6}{5}$ = inverted to $\frac{5}{6}$; $\frac{5}{6} \times \frac{26}{1}$ = $\frac{130}{6} = 21\frac{2}{3}$.

P. S. — All the specifications in this book are done in a manner similar to the specification of the Plank Shingle No. 1.

Eleven-inch Shingle No. 10.

Lengths. Dimensions.	11 × 11	11 × 12
20	24	36
21	6	4
22	9	3
23	4	2
24	5	1
25	5	3
26	1	2
27	5	3
28	5	2
29	6	4
30	5	2

Rule for finding the Contents of Eleven-inch Timber.

Divide the length by $1\frac{1}{11}$ and multiply the quotient by the breadth for the contents in feet.

What are the contents of a piece of timber 20 feet long and 11 × 12 inches?

$20 \div 1\frac{1}{11} = 18\frac{1}{3}$; $18\frac{1}{3} \times 12 = 220$ feet = *Ans.*

Timber Shingle, Twelve-inch, No. 11.

Lengths. Dimensions.	12 × 12	12 × 14	12 × 16	12 × 18	12 × 20
20	25	16	4	4	16
21	3	2	1	1	2
22	4	1	2	2	3
23	2	1		2	1
24	8	3	8	1	2
25	4	1	1	3	1
26	1	2	2	1	4
27	2	3	3	2	3
28	1	2	3	4	4
29	4	3	1	1	2
30	2	2	3	2	5

Rule for Twelve-inch Timber.

Multiply the length by the width for the contents in feet. Required, the contents of 16 pieces of 12 × 20 inch timber, and 20 feet long? 16 × 20 = 320. 320 × 20 = 6,400 feet = contents in feet of board measure.

Specification of Shingle No. 10.

Lengths. / Dimensions.	11 × 11	11 × 12	Contents.
20	24	36	12,760
21	6	4	2,194
22	9	3	2,722
23	4	2	1,434
24	5	1	1,774
25	5	3	2,085
26	1	2	834
27	5	3	2,252
28	5	2	2,028
29	6	4	3,030
30	5	2	2,272
			Total, 33,285

Specification of Shingle No. 11.

Lengths. / Dimensions.	12 × 12	12 × 14	12 × 16	12 × 18	12 × 20	Contents.
20	25	16	4	4	16	19,600
21	3	2	1	1	2	2,898
22	4	1	2	2	3	4,180
23	2	1		2	1	2,162
24	8	3	8	1	2	7,776
25	4	1	1	3	1	3,800
26	1	2	2	1	4	4,420
27	2	3	3	2	3	5.670
28	1	2	3	4	4	6,720
29	4	3	1	1	2	4,756
30	2	2	3	2	5	7,080
						Total, 69,071

Rule for finding the Contents of Battens or Two-and-a-Half-inch Stuff.

Inch.	Inch.
$2\frac{1}{2} \times 2 = \frac{5}{1\,2}$	$2\frac{1}{2} \times 8 = 1\frac{2}{3}$
$2\frac{1}{2} \times 3 = \frac{5}{8}$	$2\frac{1}{2} \times 9 = 1\frac{7}{8}$
$2\frac{1}{2} \times 4 = \frac{5}{6}$	$2\frac{1}{2} \times 10 = 2\frac{1}{1\,2}$
$2\frac{1}{2} \times 5 = 1\frac{1}{2\,4}$	$2\frac{1}{2} \times 11 = 2\frac{7}{2\,4}$
$2\frac{1}{2} \times 6 = 1\frac{1}{4}$	$2\frac{1}{2} \times 12 = 2\frac{1}{2}$
$2\frac{1}{2} \times 7 = 1\frac{1\,1}{2\,4}$	

What are the contents of a batten 22 ft. long $2\frac{1}{2}$ inches by 12 inches?

By this rule $2\frac{1}{2} \times 12$ is $= 2\frac{1}{2}$ times the length, for the contents, therefore 22 ft. $\times\ 2\frac{1}{2} = 55$ ft. *Ans.*

Batten Shingle, No. 12.

Lengths. Dimensions.	$2\frac{1}{2} \times 6$	$2\frac{1}{2} \times 7$	$2\frac{1}{2} \times 8$	$2\frac{1}{2} \times 9$	$2\frac{1}{2} \times 10$	$2\frac{1}{2} \times 11$	$2\frac{1}{2} \times 12$
20	45	15	8	4	2	12	4
21	8	3	4	4	3	4	3
22	9	4	3	3	2	1	3
23	4	3	4	4	3	3	4
24	12	8	4	2	1	4	12
25	6	9	4	3	3	3	2
26	24	8	4	3	2	1	3

Rule for finding the Contents of Battens.

Divide the length of the piece by $4\frac{4}{5}$, and multiply the product by the breadth of the piece, for the contents in feet; or multiply the length by the number given in the table for the contents. *Ans.* 30 feet.

What are the contents of a batten 24 feet long $2\frac{1}{2}$ by 6? $2\frac{1}{2} \times 6$, by the Table, is = to $1\frac{1}{4}$ times the length; $24 \times 1\frac{1}{4} = 30$ feet.

Second Solution. — $24 \div 4\frac{4}{5} = 5$; $5 \times 6 = 30$ feet.

The specification is made out according to the last solution.

Specification of Batten Shingle, No. 12.

Lengths. Dimensions.	$2\frac{1}{2} \times 6$	$2\frac{1}{2} \times 7$	$2\frac{1}{2} \times 8$	$2\frac{1}{2} \times 9$	$2\frac{1}{2} \times 10$	$2\frac{1}{2} \times 11$	$2\frac{1}{2} \times 12$	Contents.
20	45	15	8	4	2	12	4	2,812
21	8	3	4	4	3	4	3	1,080
22	9	4	3	3	2	1	3	917
23	4	3	4	4	3	3	4	1,073
24	12	8	4	2	1	4	12	1,880
25	6	9	4	3	3	3	2	1,276
26	24	8	4	3	2	1	3	1,765
								Total, 10,803

Random Shingle No. 13, *for any Dimension.*

(*Contents given in the Columns.*)

$\frac{1}{4}$ In. Mer. Boards.	2×3	2×4	2×8	2×12	3×4	3×9	5×12	6×8	7×7	10×12	12×12	$2\frac{1}{2} \times 8$	$2\frac{1}{2} \times 9$	4×12
100	700	250	150	120	120	150	250	210	210	120	120	160	200	120
200	120	210	250	210	100	120	–	–	410	250	120	120	200	210
250	160	640	300	150	100	60	160	420	210	120	600	150	250	150
300	240	120	350	320	210	20	–	150	312	120	150	100	100	120
275	100	240	400	150	120	40	500	600	200	200	120	200	100	150
868	120	150	500	210	250	36	–	500	100	120	210	150	100	100
210	200	180	120	641	100	12	250	120	100	100	100	200	100	200
450	250	200	240	120	100	–	–	–	–	–	–	150	200	120
150		150	60			–	–	–	–	–	–	–	–	–

Method of keeping Shingle No. 13.

The contents are found by the Board Rule and marked on each piece, and afterwards placed in the proper column in the shingle.

What is the total number of feet of merchantable spruce lumber in Random Shingle, No. 13. *Ans.* 23,464 feet.

Random Shingle, No. 14.

(*Running Lengths given in the Columns.*)

2 × 10	3 × 6	4 × 8	4 × 9	5 × 5	5 × 6	6 × 6	7 × 7	7 × 9	8 × 10	10 × 12	Contents of the whole.
100	80	100	200	72	120	100	120	20	120	50	3 × 6 = 1,045
100	60	150	100	72	100	100	100	18	150	20	2 × 10 = 2,833
25	40	210	75	60	150	120	100	16	120	40	4 × 8 = 4,186
125	20	110	60	40	100	200	40	24	100	20	4 × 9 = 2,970
100	15	200	40	18	110	110	20	20	100	100	5 × 5 = 1,096
200	-	-	20	19	70	120	100	18	200	100	5 × 6 = 2,137
100	28	150	10	20	60	150	60	16	100	100	6 × 6 = 3,525
100	36	120	75	70	40	100	50	19	150	-	7 × 7 = 2,797
100	72	100	100	60	20	60	40	24	250	150	7 × 9 = 1,118
200	150	12	150	40	30	40	20	20	100	200	8 × 10 = 10,466
150	96	150	60	20	20	20	15	-	120	120	10 × 12 = 10,500
400	100	160	100	15	20	25	20	18	-	-	
-	-	-	-	20	15	30	-	-	60	150	
1700	697	1570	990	526	855	1175	685	213	1570	1050	Total . 42,673 ft.
$1\frac{2}{3}$	$1\frac{1}{2}$	$2\frac{2}{3}$	3	$2\frac{1}{3}$	$2\frac{1}{12}$	3	$4\frac{1}{12}$	$5\frac{1}{4}$	$6\frac{2}{3}$	10	
1700	697	3140	2970	1052	1710	3525	2749	1065	9420	10500	
1133	348	1046		44	427		57	53	1046		
2833	1045	4186		1096	2137		2797	1118	10466		

TABLE B. — *Showing the Number of Feet in Length of the following Dimensions, that will make* 1,000 *Feet of Board Measure.*

Dimensions.	No. of feet in Length = to 1,000 feet of Contents.	Contents.	Dimensions.	No. of feet in Length = to 1,000 feet of Contents.	Contents.	Dimensions.	No. of feet in Length = to 1,000 feet of Contents.	Contents.	Dimensions.	No. of feet in Length = to 1,000 feet of Contents.	Contents.
2 × 2	3000	1000	4 × 7	$428\frac{4}{7}$	1000	7 × 10	$171\frac{3}{7}$ =	1000	$2\frac{1}{2}$ × 5	960	1000
2 × 3	2000	1000	4 × 8	375	1000	7 × 11	$155\frac{05}{77}$ =	1000	$2\frac{1}{2}$ × 6	800	1000
2 × 4	1500	1000	4 × 9	$333\frac{1}{3}$	1000	7 × 12	$142\frac{6}{7}$ =	1000	$2\frac{1}{2}$ × 7	$685\frac{5}{7}$	1000
2 × 5	1200	1000	4 × 10	300	1000	8 × 8	$187\frac{1}{2}$ =	1000	$2\frac{1}{2}$ × 8	600	1000
2 × 6	1000	1000	4 × 11	$272\frac{8}{11}$	1000	8 × 9	$166\frac{2}{3}$ =	1000	$2\frac{1}{2}$ × 9	$533\frac{1}{3}$	1000
2 × 7	$857\frac{1}{7}$	1000	4 × 12	250	1000	8 × 10	150 =	1000	$2\frac{1}{2}$ × 10	480	1000
2 × 8	750	1000	5 × 5	480	1000	8 × 11	$136\frac{4}{11}$ =	1000	$2\frac{1}{2}$ × 11	$436\frac{4}{11}$	1000
2 × 9	$666\frac{2}{3}$	1000	5 × 6	400	1000	8 × 12	125 =	1000	$2\frac{1}{2}$ × 12	400	1000
2 × 10	600	1000	5 × 7	$342\frac{6}{7}$	1000	9 × 9	$148\frac{4}{27}$ =	1000	$2\frac{1}{4}$ × 3	$1777\frac{7}{9}$	1000
2 × 11	$545\frac{5}{11}$	1000	5 × 8	300	1000	9 × 10	$133\frac{1}{3}$ =	1000	$2\frac{1}{4}$ × 4	$1333\frac{1}{3}$	1000
2 × 12	500	1000	5 × 9	$266\frac{2}{3}$	1000	9 × 11	$121\frac{7}{33}$ =	1000	$2\frac{1}{4}$ × 5	$1066\frac{2}{3}$	1000
3 × 3	$1333\frac{1}{3}$	1000	5 × 10	240	1000	9 × 12	$111\frac{1}{9}$ =	1000	$2\frac{1}{4}$ × 6	$888\frac{8}{9}$	1000
3 × 4	1000	1000	5 × 11	$218\frac{2}{11}$	1000	10 × 10	120 =	1000	16 × 18	$41\frac{2}{3}$	1000
3 × 5	800	1000	5 × 12	200	1000	10 × 11	$109\frac{1}{11}$ =	1000	20 × 20	30	1000
3 × 6	$666\frac{2}{3}$	1000	6 × 6	$333\frac{1}{3}$	1000	10 × 12	100 =	1000	20 × 24	25	1000
3 × 7	$571\frac{3}{7}$	1000	6 × 7	$285\frac{5}{7}$	1000	11 × 11	$99\frac{21}{121}$ =	1000	18 × 20	$33\frac{1}{3}$	1000
3 × 8	500	1000	6 × 8	250	1000	11 × 12	$90\frac{10}{11}$ =	1000	14 × 16	$53\frac{4}{7}$	1000
3 × 9	$444\frac{4}{9}$	1000	6 × 9	$222\frac{2}{9}$	1000	12 × 12	$83\frac{1}{3}$ =	1000	15 × 18	$44\frac{4}{9}$	1000
3 × 10	400	1000	6 × 10	200	1000	12 × 14	$71\frac{3}{7}$ =	1000	22 × 24	$22\frac{8}{11}$	1000
3 × 11	$363\frac{7}{11}$	1000	6 × 11	$181\frac{9}{11}$	1000	12 × 16	$62\frac{1}{2}$ =	1000	18 × 24	$27\frac{7}{9}$	1000
3 × 12	$333\frac{1}{3}$	1000	6 × 12	$166\frac{2}{3}$	1000	12 × 18	$55\frac{5}{9}$ =	1000	13 × 14	$65\frac{85}{91}$	1000
4 × 4	750	1000	7 × 7	$244\frac{44}{49}$	1000	12 × 20	50 =	1000	16 × 20	$37\frac{1}{2}$	1000
4 × 5	600	1000	7 × 8	$214\frac{2}{7}$	1000	$2\frac{1}{2}$ × 3	1600 =	1000	30 × 40	10	1000
4 × 6	500	1000	7 × 9	$190\frac{10}{21}$	1000	$2\frac{1}{2}$ × 4	1200 =	1000	36 × 36	$9\frac{7}{27}$	1000

P. S. — This Table will be useful to those who retail Lumber.

Rule showing how Table B is calculated.

Divide the area or contents of the end into the given number of feet of contents, and the quotient will be the number of feet of running lengths, equivalent to the given number of feet of contents.

1. What number of feet in length of 10 inches by 12 inches will be equal to 1,000 feet contents.

By the table 10 inches $\times$ 12 inches is 10 times the length, for the contents; therefore, 1,000$\div$10=100 feet in length.

2. How many feet of 2 $\times$ 3 are equal to 1,000 feet of contents?

2 $\times$ 3 = $\frac{1}{2}$ the length; therefore, 1,000 $\times$ 2 = 2,000 feet = length required.

TABLE C.—*Number of Feet of the following Dimensions of Timber that will make* 1,000 *Feet, Cubic or Solid Measurement.*

Dimensions.	No. of Feet in Length.	Cubic Feet.	Dimensions.	No. of Feet in Length.	No. of ft. of Cubic Measure.
5 $\times$ 5	5,760	1,000	7 $\times$ 12	1,714$\frac{2}{7}$	1,000
5 $\times$ 6	4,800	1,000	8 $\times$ 8	2,250	1,000
5 $\times$ 7	4,114$\frac{2}{7}$	1,000	8 $\times$ 9	2,000	1,000
5 $\times$ 8	3,600	1,000	8 $\times$ 10	1,800	1,000
5 $\times$ 9	3,200	1,000	8 $\times$ 11	1,636$\frac{4}{11}$	1,000
5 $\times$ 10	2 880	1,000	8 $\times$ 12	1,500	1,000
5 $\times$ 11	2,618$\frac{2}{11}$	1,000	9 $\times$ 9	1,777$\frac{7}{9}$	1,000
5 $\times$ 12	2,400	1,000	9 $\times$ 10	1,600	1,000
6 $\times$ 6	4,000	1,000	9 $\times$ 11	1,455$\frac{5}{11}$	1,000
6 $\times$ 7	3,428$\frac{4}{7}$	1,000	9 $\times$ 12	1,333$\frac{1}{3}$	1,000
6 $\times$ 8	3,000	1,000	10 $\times$ 10	1,440	1,000
6 $\times$ 9	2,666$\frac{2}{3}$	1,000	10 $\times$ 11	1,309$\frac{1}{11}$	1,000
6 $\times$ 10	2,400	1,000	10 $\times$ 12	1,200	1,000
6 $\times$ 11	2,181$\frac{9}{11}$	1,000	11 $\times$ 11	1,190$\frac{10}{121}$	1,000
6 $\times$ 12	2,000	1,000	11 $\times$ 12	1,090$\frac{10}{11}$	1,000
7 $\times$ 7	2,938$\frac{38}{49}$	1,000	12 $\times$ 12	1,000	1,000
7 $\times$ 8	2,571$\frac{3}{7}$	1,000	14 $\times$ 16	642$\frac{6}{7}$	1,000
7 $\times$ 9	2,285$\frac{5}{7}$	1,000	16 $\times$ 18	500	1,000
7 $\times$ 10	2,057$\frac{1}{7}$	1,000	18 $\times$ 20	400	1,000
7 $\times$ 11	1,870$\frac{10}{77}$	1,000	20 $\times$ 22	327$\frac{3}{11}$	1,000
–	–	1,000	22 $\times$ 24	272$\frac{8}{11}$	1,000

Rule showing how Table C is computed.

Multiply the breadth and width in inches together, and divide the product by 144, the number of inches in a square foot, and the quotient divided into the given number of cubic feet will give the number of feet in length, equal to said number of feet.

How many feet running length of 6 inches × 6 inches are equal to 1,000 cubic feet? *Ans.* 4,000 feet.

$6 \times 6 = 36$; $36 \div 144 = \frac{36}{144} = \frac{1}{4}$; $\frac{1}{4}$ inverted = to $\frac{4}{1} \times \frac{1000}{1} = \frac{4000}{1} = 4{,}000$ feet of running lengths = 1,000 cubic feet.

Table showing the Numbers to multiply the Lengths of the following Dimensions by in order to find the Contents in Cubic Feet.

Dimension.	No.	Dimension.	No.	Dimension.	No.
5 × 5 =	$\frac{25}{144}$	7 × 11 =	$\frac{77}{144}$	12 × 16 =	$1\frac{1}{3}$
5 × 6 =	$\frac{5}{24}$	7 × 12 =	$\frac{7}{12}$	13 × 14 =	$1\frac{9}{72}$
5 × 7 =	$\frac{35}{144}$	8 × 8 =	$\frac{4}{9}$	14 × 16 =	$1\frac{5}{9}$
5 × 8 =	$\frac{5}{18}$	8 × 9 =	$\frac{1}{2}$	16 × 18 =	2
5 × 9 =	$\frac{5}{16}$	8 × 10 =	$\frac{5}{9}$	16 × 20 =	$2\frac{2}{9}$
5 × 10 =	$\frac{25}{72}$	8 × 11 =	$\frac{11}{18}$	18 × 20 =	$2\frac{1}{2}$
5 × 11 =	$\frac{55}{144}$	8 × 12 =	$\frac{2}{3}$	20 × 22 =	$3\frac{1}{18}$
5 × 12 =	$\frac{5}{12}$	9 × 9 =	$\frac{9}{16}$	22 × 24 =	$3\frac{2}{3}$
6 × 6 =	$\frac{1}{4}$	9 × 10 =	$\frac{5}{8}$	24 × 26 =	$4\frac{1}{3}$
6 × 7 =	$\frac{7}{24}$	9 × 11 =	$\frac{11}{16}$	26 × 28 =	$5\frac{1}{18}$
6 × 8 =	$\frac{1}{3}$	9 × 12 =	$\frac{3}{4}$	28 × 30 =	$5\frac{5}{6}$
6 × 9 =	$\frac{3}{8}$	10 × 10 =	$\frac{25}{36}$	30 × 32 =	$6\frac{2}{3}$
6 × 10 =	$\frac{5}{12}$	10 × 11 =	$\frac{55}{72}$	32 × 34 =	$7\frac{5}{9}$
6 × 11 =	$\frac{11}{24}$	10 × 12 =	$\frac{5}{6}$	34 × 36 =	$8\frac{1}{2}$
6 × 12 =	$\frac{1}{2}$	11 × 11 =	$1\frac{21}{144}$	36 × 38 =	$9\frac{1}{2}$
7 × 7 =	$\frac{49}{144}$	11 × 12 =	$1\frac{1}{12}$	38 × 40 =	$10\frac{5}{9}$
7 × 8 =	$\frac{7}{18}$	12 × 12 =	1	40 × 42 =	$11\frac{2}{3}$
7 × 9 =	$\frac{7}{16}$	12 × 14 =	$1\frac{1}{6}$	42 × 44 =	$12\frac{5}{6}$
7 × 10 =	$\frac{35}{72}$				

QUESTIONS FOR EXERCISE.

1. Required the number of solid feet in a timber 6 inches $\times$ 6 inches and 40 feet long? *Ans.* 10 feet.

Solution. — $6 \times 6 = \frac{1}{4}$ of length, therefore $\frac{1}{4}$ of $40 =$ 10 feet.

2. What is the solidity of a piece of 6-inch $\times$ 12-inch timber 72 feet long? *Ans.* 36 feet.

By the table $6 \times 12 = \frac{1}{2}$ the length, for the contents; therefore $\frac{1}{2} \times 72 = 36$ feet.

3. What number of cubic feet are there in a piece of timber 40 feet long, 22 inches $\times$ 24 inches?

Ans. $146\frac{2}{3}$ feet.

4. Required the number of feet in a piece of timber 32 feet long, 5 inches $\times$ 12 inches? *Ans.* $13\frac{1}{3}$ feet.

Solution. — 32 feet $\times \frac{5}{12} = 13\frac{1}{3}$ feet $=$ contents.

5. What number of cubic feet in the following pieces, namely, 6 pieces 60 feet long 12 inches $\times$ 16 inches, and 12 pieces 35 feet long and 16 inches $\times$ 18 inches?

Ans. 15,840 feet.

6. What are the contents in cubic feet of 6 pieces of 20 inches $\times$ 24 inches and 35 feet long?

Ans. $111\frac{2}{3}$ cubic feet.

7. What number of cubic feet in a piece of timber 28 inches $\times$ 30 inches and 60 feet long? *Ans.* 350 cubic feet.

Solution. — $60 \times 5\frac{5}{6} = 350$ feet of cubic measure.

8. Required the contents in cubic feet of a piece of pine timber 30 inches $\times$ 32 inches and 30 feet in length?

Ans. 200 feet.

9. How many tons of timber (allowing 42 cubic feet to the ton) in a piece of timber 38 inches $\times$ 40 inches and 45 feet long? *Ans.* $11\frac{1}{4}$ tons.

10. What will be the cost of a piece of pine timber 18 inches $\times$ 20 inches and 30 feet in length @ 30 cents per cubic foot? *Ans.* $22.50.

Rule to reduce Feet of Board Measure to Cubic Feet.

Divide the contents in superficial feet by 12, and it will give the number of cubic feet; or multiply the number of cubic feet by 12 and the product will be feet of board measure.

In 1,200 feet of board measure how many cubic feet are there? *Ans.* 100 cubic feet.

Solution. — 1,200 ÷ 12 = 100 cubic feet.

Required the number of feet of board measure in 100 feet of cubic measure? *Ans.* 1,200 feet.

100 × 12 = 1,200 feet of board measure.

Second Method of making out a Specification.

3-INCH SPECIFICATION BY THE SECOND METHOD.

Lengths. Dimensions.	3 × 6	3 × 7	3 × 8	3 × 9	3 × 10	3 × 11	3 × 12	Contents.
14	2	3	4	6	8	4	6	
15	4	2	1	4	2	8	4	
16	2	4	2	1	3	2	4	
17	6		1		1	3	2	
18	8	4	6	1	3	2	4	
19	2	1	2	3	2	4	6	
20	3	2	1	4	2	1	3	
21	6	4	8	2	1	3	2	
22	1	5	4	3	2	1	1	
23	2	1	10	4	1	2	1	
24		6		4		3	2	
25	4		2	8	6		4	
26		3	2	1		2	8	
27	6	5	1		3		2	
28		8		2		4	6	
29	3		5	2	1	6	4	
	1510	1864	2092	2140	1717	2563	3807	15,693 feet.

Second Rule for Specifications.

Multiply the number of pieces or dots in each square of the specification by the length of one of the pieces; and multiply the product thus found by $\frac{1}{4}$ of the breadth of said pieces for the contents in board measure of 3-inch deals; by $\frac{1}{3}$ of the breadth for 4-inch; by $\frac{1}{6}$ of it for plank, etc.

Example showing how to make out the Three-inch Specification by Second Method.

First Column 6 inches wide.	Second Column 7 inches wide.
$14 \times 2 = 28$	$14 \times 3 = 42$
$15 \times 4 = 60$	$15 \times 2 = 30$
$16 \times 2 = 32$	$16 \times 4 = 64$
$17 \times 6 = 102$	$18 \times 4 = 72$
$18 \times 8 = 144$	$19 \times 1 = 19$
$19 \times 2 = 38$	$20 \times 2 = 40$
$20 \times 3 = 60$	$21 \times 4 = 84$
$21 \times 6 = 126$	$22 \times 5 = 110$
$22 \times 1 = 22$	$23 \times 1 = 23$
$23 \times 2 = 46$	$24 \times 6 = 144$
$25 \times 4 = 100$	$26 \times 3 = 78$
$27 \times 6 = 162$	$27 \times 5 = 135$
$29 \times 3 = 87$	$28 \times 8 = 224$
1,007	1,065
$1\frac{1}{2}$	$1\frac{3}{4}$
1,007	1,065
503	799
Contents, 1,510 feet.	Contents, 1,864 feet.
6 inches, the breadth, divided by 4 is = to $1\frac{1}{2}$, and $1\frac{1}{2} \times 1{,}007 = 1{,}510$, the contents.	7 inches, the breadth, divided by 4 is = to $1\frac{3}{4}$, and $1\frac{3}{4} \times 1{,}065 = 1{,}864$ feet = contents.

English deal specifications are generally made out by the second method. Both rules will give the same results.

Specification of Philadelphia Deal Shingle.

Lengths.	Dimensions. 3 × 12	Contents.	Lengths.	Dimensions. 3 × 12	Contents.
14	40	1,680	28	14	1,176
16	35	1,680	30	8	720
18	30	1,620	32	4	384
20	11	660	34	4	408
22	9	594	36	7	756
24	21	1,512	38	14	1,596
26	6	468	40	14	1,680

Contents, 14,934 feet.

Philadelphia Deal Shingle.

Lengths.	Dimensions. 3 × 12	Lengths.	Dimensions. 3 × 12
14	40	28	14
16	35	30	8
18	30	32	4
20	11	34	4
22	9	36	7
24	21	38	14
26	6	40	14

The specification of Philadelphia deals is done the same as the 3-inch specification; or multiply the running lengths by 3 for the contents in feet of board measure. Philadelphia deal is generally 12 inches wide and even lengths, from 14 feet up, and the best quality of spruce lumber. English deals generally comprise all deals too short, or not good enough for Philadelphia or New York deals. Also short timber, battens, and plank, not suitable for other markets, go into the English deal pile. Deals that are knotty, cracked by the sun, or stained, or having wanes on them, and not poor enough for refuse, go to the English deal pile. New York deal must be the best quality of spruce, from 14 feet long up.

Directions showing how to measure all kinds of Lumber by the Board Rule.

Lay your rule across the board to be measured, at right angles to the further edge of the board, and let the outside edge of the board and further end of the rule be both even on that side, then observe the length of your board and turn your rule to the same length, then look on the line or column of that length, and you will find the contents marked on the rule just over the inside edge of the board.

EXAMPLES FOR PRACTICE.

1. What are the contents of a $1\frac{1}{4}$-inch board 16 feet long and 12 inches wide? *Ans.* 20 feet.

By the rule the contents given for 1-inch board is 16 feet contents, to which add $\frac{1}{4}$ of the contents, which will give the contents for $1\frac{1}{4}$-inch boards. $16 \div 4 = 4$; $16 + 4 = 20$ feet contents.

2. What are the contents of a board 32 feet long and 12 inches wide? *Ans.* 32 feet.

As there is no 32 on my rule, I find the contents by the rule of a board, half the length to be 16 feet; which being doubled, gives the contents required = 32 feet.

3. What are the contents of a $1\frac{1}{2}$-inch board 20 feet long and 12 inches wide? *Ans.* 30 feet.

By the rule an inch board 20 feet long and 12 inches wide will contain 20 feet, to which add half of 20 for the contents of a $1\frac{1}{2}$-inch board. $20 \div 2 = 10$; $20 + 10 = 30$ feet.

4. Required the contents of a plank 24 feet long 2 inches $\times$ 12 inches? *Ans.* 48 feet.

By the board rule, in a board 24 feet long 12 inches wide and 1 inch thick there are 24 feet, and as plank is 2 inches thick, therefore twice the contents of the face of it will be equal to the true contents, $24 \times 2 = 48$ feet.

Rule for any Dimension.

Multiply the number of feet in the face of the piece to be measured, by the thickness in inches, and it will give the contents in feet of board measure.

Rule for measuring Logs or Round Timber.

Multiply the length, taken in feet, by the square of one fourth of the mean girth, taken in inches, and this product divided by 144 will give the contents in cubic feet.

NOTE. — The girth of tapering timber is usually taken about one third the distance from the larger to the smaller end. The rule is that in common use, though very far from giving the actual number of cubic feet; 40 cubic feet as given by the rule are in fact $= 50\frac{22}{100}$ true cubic feet.

EXAMPLE.

1. How many cubic feet in a stick of timber which is 40 feet long, and whose girth is 60 inches? *Ans.* $62\frac{1}{2}$ feet.

$60 \div 4 = 15$ inches $= \frac{1}{4}$ of girth; $15 \times 15 = 225 =$ square of quarter of the girth; 225×40 feet $= 9{,}000$; $9{,}000 \div 144 = 62\frac{1}{2}$ cubic feet.

2. How many cubic feet in a piece of timber 21 feet long, and whose girth is 36 inches?

3. What are the contents of a log 100 feet long, and whose girth is 150 inches?

To find the largest Square Piece of Timber that may be sawed from a Round Stick of Timber, having the Diameter or Circumference of the Small End given.

Rule 1. — Multiply the given diameter by .707106, or, multiply the given circumference by .225079. Or, as the diameter of a circle is equal to the diagonal of the inscribed square —

Rule 2. — Square the diameter and take half the sum of the square, and extract the square root of it, and the root thus found will be the side of the inscribed square.

EXAMPLE.

1. I have a piece of timber 30 inches in diameter; how large a square stick can be hewn from it.

By the last rule 30 squared $= 30 \times 30 = 900$; $900 \div 2 = 450$; $\sqrt{450} = 21.21+$ inches square.

2. How large a square stick may be hewn from a piece of round timber 120 inches in circumference?

3. How large a square stick may be sawn from a piece of round timber 60 inches in diameter?

Having the Side of a Square Stick given, to find the Diameter of the Tree from which it was sawn.

Rule. — Square the side and double it, and out of the product extract the square root.

What must be the diameter of a tree that when hewn shall be 18 inches square? *Ans.* 25.44 inches.

TABLE.

12 lines = 1 inch.
12 inches = 1 foot.
3 feet = 1 yard.
Inches multiplied by inches produce
Parts marked thus $'$.
Parts by parts give fourths, marked thus $''''$.

Inches are marked ′.
144 square inches make 1 square foot.
9 square feet = 1 square yard.
1,728 cubic inches = 1 cubic foot.
50 cubic feet = 1 load.
40 cubic feet = 1 ton of timber.
16 cubic feet = 1 cord foot.
8 cord feet, or 128 cubic feet = 1 cord of wood.
1,980 feet superficial = 1 St. Petersburg standard of deals.

Form of a Bill of Lading of Timber, Shingle No. 8, etc., etc.

SHIPPED, in good order and condition, by Edmond B. Sanderson & Co., on board the good ship "Southern," whereof James Brown is master for this present voyage, now lying in the port of New York, U. S., and bound for Liverpool, England. To say: —

47,928 ft. Mer. spruce, all under deck,
100 M spruce laths, all under deck,
80 M ft. Mer. pine, all on deck,

being marked and numbered as in the margin; and are to be delivered, in like good order and condition, at the aforesaid port of Liverpool (the danger of the seas and fire always excepted), unto David Belt & Sons, or to assigns, he or they paying freight for the said timber at the rate of ten dollars per M feet, and one dollar per M for laths, without primage and average accustomed.

In witness whereof, the master of the said vessel hath affirmed to three bills of lading, all of this tenor and date; one of which being accomplished, the others to stand void.

JAMES BROWN.

Dated at NEW YORK, U. S.,
May the 3d, A. D. 1870.

Bill of Lading.

Paid on the above, by T. Pandol & Co., one hundred dollars.

SHIPPED, in good order and condition, by T. Pandol & Co., on board the good schooner called the "Northern Dawn," whereof Daniel E. Bloomer is master for this present voyage, now lying in the port of Bangor, Me., and bound for New York. To say: —

110 M feet hemlock lumber, all under deck,
75 M feet spruce lumber, all on deck,
120 M laths, all on deck,

being marked and numbered as in the margin; and are to be delivered, in like good order and condition, at the aforesaid port of New York (the danger of the seas and fire only excepted), unto Messrs. Denton and Beeters, or to assigns, he or they paying freight for the said lumber at the rate of four dollars per M feet, and sixty cents per M for laths, without primage and average accustomed.

In witness whereof, the master of the said vessel hath affirmed to three bills of lading, all of this tenor and date; one of which being accomplished, the others to stand void.

DANIEL E. BLOOMER.

Dated at BANGOR, ME.,
June the 3*d*, 1869.

Surveyor's Bill for Services rendered.

BANGOR, ME., *June the* 2*d*, 1869.

Messrs. DUNTON & BOOMER,

To DANIEL E. SHAW, surveyor, Dr.

For surveying 250 M ft. of spruce lumber to schooner "Juno," @ 25c. per M $62.50

Survey Bill of Lumber, etc.

Surveyed from James E. Dale & Sons, of Clinton, Iowa, to schooner "Pallas," Captain Dunn. To say: —

36,500 ft. 2 × 6, from 12 ft. long up (mch.), spruce.
35,600 " No. 1 pine boards.
22,400 " hemlock boards (mch.).
15,000 " 8 × 10 Mer. pine timber.
250 M No. 1 pine shingles.

THOMAS B. PROUDFOOT,
Surveyor.

CLINTON, IOWA,
June the 12th, Anno Domini 1869.

Surveyor's Receipt.

$62.50. BANGOR, ME., *June the 4th*, A.D. 1869.

Received from Messrs. DUNTON & BOOMER sixty-two dollars and fifty cents, which pays for surveying 250 M feet of spruce lumber to schooner "Juno," @ 25c. per M.

DANIEL E. SHAW, *Surveyor.*

NOVEL RULES

For finding the Contents of Plank, Deal, Battens, Joist, and Timber, by multiplying a Fractional Part of the Length by the Breadth.

2-inch is $\frac{1}{6}$ of the length multiplied by the breadth, for the contents.
3-inch is $\frac{1}{4}$ of the length multiplied by the breadth, for the contents.
4-inch is $\frac{1}{3}$ of the length multiplied by the breadth, for the contents.
5-inch is the length divided by $2\frac{2}{5}$, and the quotient multiplied by the breadth.

6-inch is $\frac{1}{2}$ of the length multiplied by the breadth, for the contents.

7-inch is the length divided by $1\frac{5}{7}$, and the quotient multiplied by the breadth.

8-inch is the length divided by $1\frac{1}{2}$, and the quotient multiplied by the breadth.

9-inch is the length divided by $1\frac{1}{3}$, and the quotient multiplied by the breadth.

10-inch is the length divided by $1\frac{1}{5}$, and the quotient multiplied by the breadth.

11-inch is the length divided by $1\frac{1}{11}$, and the quotient multiplied by the breadth.

12-inch, multiply the length by the width, for the contents.

$2\frac{1}{2}$-inch, or battens, is the length divided by $4\frac{4}{5}$, and the quotient multiplied by the breadth.

P. S. — The above rules give the contents in feet of board measure.

EXAMPLES FOR PRACTICE.

1. Required the contents in superficial feet of a piece of timber 10 inches $\times$ 12 inches and 40 feet long.

Ans. 400 feet.

Solution. — By the table, 10 inches is $1\frac{1}{5}$ of the length multiplied by the breadth. Therefore 40 feet $\div$ $1\frac{1}{5}$ = $\frac{40}{1} \times \frac{5}{6} = \frac{200}{6} = 33\frac{1}{3}$; $33\frac{1}{3} \times 12 = 400$ feet.

2. What are the contents of a piece of timber 12 inches $\times$ 20 inches, and 40 feet long? *Ans.* 800 feet.

Solution. — $40 \times 20 = 800$ feet.

3. What are the contents of a plank 2 inches $\times$ 11 inches and 36 feet long? *Ans.* 66 feet.

Solution. — 2 inches is $\frac{1}{6}$ of the length. Therefore $36 \div 6 = 6$; $6 \times 11 = 66$ feet.

4. What are the contents of a piece of timber 8 inches $\times$ 11 inches and 40 feet in length? *Ans.* $293\frac{1}{3}$ feet.

Solution. — $40 \div 1\frac{1}{2} = \frac{40}{1}$; $\frac{40}{1} \times \frac{2}{3} = \frac{80}{3} = 26\frac{2}{3}$; $26\frac{2}{3} \times 11 = 293\frac{1}{3}$ feet.

Given the Breadth of a Rectangular Plank in Inches, to find how much in Length will make a Foot, or any other required Quantity.

Rule. — Divide 144, or the area to be cut off, by the breadth in inches, and the quotient will be the length in inches.

1. If a board be 6 inches broad, what length of it will make a square foot? *Ans.* 2 feet.

Solution. — 144 inches ÷ 6 inches = 24 inches; 24 inches ÷ 12 inches = 2 feet.

2. If a plank be 2 inches × 8 inches in size, what length of it will make 4 square feet? *Ans.* 3 feet.

Solution. — 2 × 8 = 16, area of the end; 144 ÷ 16 = 9 inches for 1 foot, which, being multiplied by 4 = 4 × 9 = 36 inches = 3 feet.

To find the Solid Contents of a Piece of Timber tapering regularly.

Rule. — Multiply the sum of the breadths of the two ends by the sum of the depths, to which add the product of the breadth and depth of each end; $\frac{1}{6}$ of this sum, multiplied by the length, will give the exact solidity of any piece of squared timber tapering regularly.

1. How many feet in a piece of mahogany whose ends are rectangles, the length and breadth of one being 14 and 12 inches, and the corresponding dimensions of the other end 6 and 4 inches; also the length $30\frac{1}{2}$ feet?

Ans. $18\frac{2}{27}$ cubic feet.

Solution. —

$14 + 6 = 20$ $\quad$ $12 \times 14 = 168$

$12 + 4 = 16$ $\quad$ $6 \times 4 = 24$

$20 \times 16 = 320$

512 sq. in. = $\frac{32}{9}$ sq. ft.

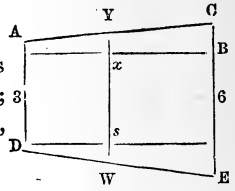
Then $\frac{1}{6} \times \frac{32}{9} \times 30\frac{1}{2} = 18\frac{2}{27}$ cubic feet.

When a Board or Plank is broader at one End than the other, to find what Length of it will make a Foot, or any other required Quantity.

Rule. — To the square of the product of the length and narrow end add twice the continual product of these quantities; namely, the length, the difference between the breadths of the ends, and the area of the part required to be cut off. Extract the square root of the sum; from the result deduct the product of the length and narrow end, and divide the remainder by the difference between the breadths of the ends.

EXAMPLE.

It is required to cut off 60 inches from the smaller end of a board; A D being 3 inches, C E 6 inches, and A B 20 inches.



Here $A\ x = \frac{1}{2BC}\left(\sqrt{\left\{\left(AB \times AD\right)^2 + 4\ B\ C \times AB \times 60\right\}} - AB \times AD\right) = \frac{1}{3}\left(\sqrt{\left\{\left(20 \times 3\right)^2 + 6 \times 20 \times 60\right\}} - 20 \times 3\right) = 14.64$, the length required.

To find how much in Length will make a Solid Foot, or any other required Quantity, of Squared Timber, of equal Dimensions from End to End.

Rule. — Divide 1,728 — the solid inches in a foot, or the solidity to be cut off — by the area of the end in inches.

1. If a piece of timber be 14 inches broad and 10 inches deep, how much of it will make a solid foot?

Ans. $12\frac{2}{5}$ inches, the length required.

$10 \times 14 = 140$; $1{,}728 \div 140 = 12\frac{2}{5}$ inches.

Rule. — Multiply the area corresponding to the quarter girt in inches, by the length of the piece in feet, and the product will be the solidity. If the quarter girt exceeds the limits of the table, take $\frac{1}{2}$ of it, and 4 times the contents thus found will give the required contents.

A Table for Measuring Timber.

Quarter Girt.	Area.	Quarter Girt.	Area.	Quarter Girt.	Area.
Inches.	Feet.	Inches.	Feet.	Inches.	Feet.
6	.250	12	1.000	18	2.250
$6\frac{1}{4}$	.272	$12\frac{1}{4}$	1.042	$18\frac{1}{2}$	2.376
$6\frac{1}{2}$	.294	$12\frac{1}{2}$	1.085	19	2.506
$6\frac{3}{4}$	.317	$12\frac{3}{4}$	1.129	$19\frac{1}{2}$	2.640
7	.340	13	1.174	20	2.777
$7\frac{1}{4}$	.364	$13\frac{1}{4}$	1.219	$20\frac{1}{2}$	2.917
$7\frac{1}{2}$	.390	$13\frac{1}{2}$	1.265	21	3.062
$7\frac{3}{4}$	.417	$13\frac{3}{4}$	1.313	$21\frac{1}{2}$	3.209
8	.444	14	1.361	22	3.362
$8\frac{1}{4}$	.472	$14\frac{1}{4}$	1.410	$22\frac{1}{2}$	3.516
$8\frac{1}{2}$	.501	$14\frac{1}{2}$	1.460	23	3.673
$8\frac{3}{4}$	.531	$14\frac{3}{4}$	1.511	$23\frac{1}{2}$	3.835
9	.562	15	1.562	24	4.000
$9\frac{1}{4}$	.594	$15\frac{1}{4}$	1.615	$24\frac{1}{2}$	4.168
$9\frac{1}{2}$	.626	$15\frac{1}{2}$	1.668	25	4.340
$9\frac{3}{4}$	.659	$15\frac{3}{4}$	1.722	$25\frac{1}{2}$	4.516
10	.694	16	1.777	26	4.694
$10\frac{1}{4}$	.730	$16\frac{1}{4}$	1.833	$26\frac{1}{2}$	4.876
$10\frac{1}{2}$	.766	$16\frac{1}{2}$	1.890	27	5.062
$10\frac{3}{4}$	.803	$16\frac{3}{4}$	1.948	$27\frac{1}{2}$	5.252
11	.840	17	2.006	28	5.444
$11\frac{1}{4}$	.878	$17\frac{1}{4}$	2.066	$28\frac{1}{2}$	5.640
$11\frac{1}{2}$	.918	$17\frac{1}{2}$	2.126	29	5.840
$11\frac{3}{4}$	.959	$17\frac{3}{4}$	2.187	$29\frac{1}{2}$	6.044

1. Required the contents of a piece of timber whose length is 30 feet and quarter girt is $17\frac{3}{4}$ inches.

Ans. 65.610 feet.

Solution by the Table. — Look for the quarter girt $17\frac{3}{4}$, in the column marked Quarter Girt, and in the adjoining column marked Area, will be found 2.186, which multiplied by the length, 30 feet, will be 65.610 feet for the solid contents.

Table showing the Weight in Pounds and Decimals of a Pound Avoirdupois of one Cubic Foot of the following Kinds of Wood.

Cork Wood	15.00	Maple and Riga Fir	46.87
Poplar	23.94	Ash and Dantzic Oak	47.50
Larch or Hackmatack	34.00	Apple Tree	49.56
Elm and West India Fir	34.75	Alder	50.00
Mahogany	35.00	Oak, Canadian	54.50
Pitch Pine	41.25	Boxwood, French	57.00
Cedar	37.25	Logwood	57.06
Pear Tree	41.31	Oak, English	51.87
Walnut	41.94	Oak, sixty years old	73.12
Elder Tree	43.44	Ebony	83.18
Beech	43.50	Lignum Vitæ	83.31
Cherry Tree	44.68		

Rule for finding the Weight of any kind of Timber.

Multiply the number of cubic feet it contains by the weight of one cubic foot of said timber.

EXAMPLES.

1. What is the weight of a piece of hackmatack timber 8 inches $\times$ 12 inches, and 30 feet long?

By the table given of cubic measure, 8 inches $\times$ 12 inches is $\frac{2}{3}$ of the length, for the contents; therefore $30 \div \frac{2}{3} = 20$ feet, contents.

By the table of weights a cubic foot of hackmatack is = to 34 lbs., therefore $34 \times 30 = 1{,}020$ lbs. avoirdupois.

2. What is the weight of a piece of Canadian oak 12 inches $\times$ 12 inches, and 30 feet long? *Ans.* 1,635.00 lbs.

3. What is the weight of a piece of French boxwood 10 inches $\times$ 12 inches, and 24 feet in length?

By the table of cubic measure, 10 inches $\times$ 12 inches is $\frac{5}{6}$ of the length, for the contents in cubic feet; therefore 24 $\div \frac{5}{6} =$ 20 feet, contents; 20 $\times$ 57 $=$ 1,140 lbs. $=$ weight required.

P. S. — The weight of any substance may be found as above, by finding the weight of 1 cubic foot and multiplying said weight by the contents.

TONNAGE OF VESSELS.

Government Rule. English.

For vessels aground, the length is to be measured on a straight line along the rabbet of the keel, from a perpendicular, let fall from the back of the main-post, at the height of the wing-transom, to a perpendicular at the height of the upper deck (but the middle deck of three-decked ships), from the forepart of the stern; then from the length between these perpendiculars subtract three fifths of the extreme breadth for the rake of the stern; and $2\frac{1}{2}$ inches for every foot of the height of the wing-transom above the lower part of the rabbet of the keel, for the rake abaft; and the remainder will be the length of the keel for tonnage. The main breadth is to be taken from the outside of the outside plank, in the broadest part of the ship either above or below the wales, deducting therefrom all that it exceeds the thickness of the plank of the bottom, which shall be accounted the main breadth; so that the moulding breadth, or the breadth of the frame, will then be less than the main breadth, so found, by double the thickness of the plank of the bottom.

Rule. — Then multiply the length of the keel for tonnage, by the main breadth, so taken, and the product by half the

breadth; then divide the whole by 94, and the quotient will be the tonnage.

In cutters and brigs, where the rake of the stern-post exceeds $2\frac{1}{2}$ inches to every foot in height, the actual rake is generally subtracted instead of the $2\frac{1}{2}$ inches to every foot, as before mentioned.

1. Suppose the length from the fore-part of the stern, at the height of the upper deck, to the after-part of the stern-post, at the height of the wing-transom to be 115 feet 8 inches, the breadth from outside to outside 40 feet 6 inches, and the height of the wing-transom 21 feet 10 inches, what is the tonnage? *Ans.* 1,094.

ft. in.
40 6 breadth
3

40 3 × 3 = 120.9; 120.9 ÷ 5 = 24.15.

21.10 height of wing-transom 21.10 × $2\frac{1}{2}$ = $54\frac{7}{12}$; $54\frac{7}{12}$ ÷ 12 = 4.55; 4.55 + 24.15 = 28.70; 155.66 — 28.70 = 126.96 = length.

$\frac{126.96 \times 40.25 \times 20.125}{94}$ = 1,094, the tonnage required.

2. If the length of the keel be 120 feet, and the breadth 40 feet, what is the tonnage? *Ans.* $1{,}021\frac{3}{7}$ tons.

Solution. — 120 × 40 = 4,800; 4,800 × 20 = 96,000; 96,000 ÷ 94 = $1{,}021\frac{3}{7}$ tons.

3. If the length of the keel be 80 feet, and the breadth of the beam 36 feet, what is the tonnage? *Ans.* $551\frac{2}{7}$.

4. If the length of the keel be 460 feet, and the breadth of the beam 80 feet, what is the tonnage.

Ans. 15,659 tons.

Some divide the last product by 100, to find the tonnage of king's ships, and by 95, to find that of merchant ships.

American Government Rule.

For single-decked vessels. — Take the length on deck from the forward side of the main stern to the after-side of the stern-post, and the breadth at the broadest part above the

main wales; take the depth from the under side of the deck plank to the ceiling of the hold, and deduct from the length three fifths of the breadth; multiply the remainder by the breadth, and the product by the depth, and divide the last product by 95.

For double-decked vessels. — Proceed as with single-decked vessels, except for the depth take half the breadth.

GAUGING.

Gauging signifies the art of measuring all kinds of vessels and determining their capacity or the quantity of fluid or other matter they contain. It is usual to divide casks into four varieties, which are judged of from the greater or less apparent curvature of their sides, namely: —

1. The middle frustum of a spheroid.
2. The middle frustum of a parabolic spindle.
3. The two equal frustums of a paraboloid.
4. The two equal frustums of a cone.

282 cubic inches make 1 ale gallon, or beer.

231 cubic inches make 1 wine gallon.

21,504 cubic inches make 1 malt bushel.

To find the contents of a Cask by the Mean Diameter.

Rule. — Multiply the difference of the head and bung diameters by .68 for the first variety; by .62 for the second; by .55 for the third; and by .5 for the fourth, when the difference between the head and bung diameter is less than 6 inches; but when the difference between these exceeds 6 inches, multiply that difference by .7 for the first variety; by .64 for the second; by .57 for the third; and by .52 for the fourth. Add this product to the head diameter, and the sum will be a mean diameter. Square this mean diameter, and multiply the square by the length of the cask; this product multiplied or divided by the proper multiplier or divisor, will give the contents.

1. What are the contents of a spheroidal cask, whose

length is 40 inches, bung diameter 32 inches, and head diameter 24 inches? *Ans.* 97.6 gallons.

Solution.—32 − 24 = 8; 8 × 7 = 5.6; 5.6 + 24 = 29.6 = mean diameter; 29.6 × 29.6 = 876.16 = square; 876.16 × 40 = 35046.40, which being divided by 359.5, the divisor for imperial gallons, will be equal to 97.6 gallons.

By the gauging rule —

Set 40 on C. to the G. R. 18.79 on D. against
24 on D. stands 64.99 on C.
32 on D. stands 116.2 on C.
+ 116.2

3)297.39

99.13 gallons.

Dr. Hutton's General Rule for finding the Contents of Casks.

Add into one sum 39 times the square of the bung diameter, 25 times the square of the head diameter, and 26 times the product of the two diameters; then multiply the sum by the length, and the product again by .00031$\frac{1}{3}$ for the contents in gallons.

EXAMPLE.

1. What are the contents of a cask whose length is 40 inches, and the bung and head diameters 32 and 24?

Ans. 93.4579 gallons.

32 × 32 = 1024; 1024 × 39 = 39936
24 × 24 = 576; 576 × 25 = 14400
32 × 24 = 768; 768 × 26 = 19968

74304 × 40 = 2972160
.00031$\frac{1}{3}$

93.4579

Ullaging is the art of finding what quantity of liquor is contained in a cask when partly empty. And it is consid-

ered in two positions; first, as standing on its end; secondly, lying on its side.

To find the Contents of Ullage by the Sliding Rule.

By one of the preceding problems find the whole contents of the cask. Then set the length on N. to 100 on S. S. for a segment standing, or set the bung diameter on N. to 100 on S. L. for a segment lying; then against the wet inches on N. is a number on S. S. or S. L. to be reserved. Next set 100 on B. to the reserved number on A.; then against the whole contents on B. will be found the ullage on A.

QUESTIONS FOR EXERCISE.

1. What are the contents of 20 pieces of timber 8 inches $\times$ 12 inches, and 36 feet long in cubic feet, and also in superficial feet?

2. What number of cubic feet in a log whose quarter girt is $17\frac{1}{2}$ inches and length 18 feet?

3. What are the contents of 24 logs 16 feet long whose quarter girt is 27 inches?

4. Required the tonnage of a ship by the English and American rules, the length of the keel being 125 feet and the breadth of the beam 42 feet?

5. What is the weight of a piece of hackmatack timber 8 inches $\times$ 10 inches and 28 feet in length?

6. Required the number of tons in 16 pieces of timber 24 feet long and 12 inches $\times$ 16 inches?

7. In 2,500 feet running length of 2 inches $\times$ 10 inches, how many feet of board measure?

8. In 300 feet running length of 10 inch $\times$ 12 inch timber, how many tons?

9. What are the contents of a cask of the first variety in wine and ale gallons, whose length is 50 inches, bung diameter 38 inches, and head diameter 30 inches?

10. If a log be 35 inches in diameter, what is the largest piece of square timber that can be sawed from it?

11. What difference is there between a floor 28 feet long × 20 feet broad, and two others, each of half the dimensions; and what do the three floors come to @ $9.00 per 100 square feet? *Ans.* $75.60.

12. An elm plank is 14 feet 3 inches long, and it is desired that just a square yard may be slit off from it; at what distance from the edge must the line be struck?

Ans. $7\frac{99}{171}$ inches.

13. A joist is 7 inches wide and $2\frac{1}{2}$ inches thick, but a scantling just as big again, that shall be 3 inches thick, is wanted; what will the other dimension be?

Ans. $11\frac{2}{3}$ inches.

14. The perambulator is so contrived as to turn just twice in $16\frac{1}{2}$ feet; required the diameter? *Ans.* 2.626 feet.

15. In turning a chaise within a ring of a certain diameter, it was observed that the outer wheel made two revolutions while the inner made but one; the wheels were both 4 feet high, and supposing them fixed at the distance of 5 feet asunder on the axletree, what was the circumference of the track described by the outside wheel? *Ans.* 63 feet nearly.

16. Having a rectangular board 58 inches by 27 inches, I would have a square foot cut off parallel to the shorter edge; I would then have the same quantity cut from the remainder, parallel to the longer, and this alternately repeated, till there shall not be the quantity of a foot left; what will be the dimensions of the remaining piece?

Ans. 20.7 inches by 6.086.

17. What is the length of a chord which cuts off $\frac{1}{3}$ of the area of a circle, whose diameter is 289?

Ans. 278.6716.

18. What will the diameter of a globe be, when the solidity and superficial contents are expressed by the same number? *Ans.* 6.

19. A gentleman has a garden 100 feet long and 80 feet broad, and a gravel walk is to be made of an equal width half round it; what must be the breadth of the walk to take up just half the ground? *Ans* 25.968 feet.

20. How many 3-inch cubes may be cut out of a 12-inch cube? *Ans.* 64.

21. How high above the earth must a person be raised that he may see one third of its surface?

Ans. To the height of the earth's diameter.

22. How many feet of boards would cover the surface of the earth, its diameter being 7,958 miles; and how many solid feet in it?

Ans. { 5,546,407,680,000,000. No. of feet of boards to cover it.
37,416,291,092,323,844,085,000. No. of cubic feet in the earth.

23. If the diameter of a circle be 50 feet, what is the circumference of it?

24. Two pillars standing on a horizontal plane are 120 feet asunder; the height of the higher is 100 feet, and that of the lower 80; whereabout in the plane must a person place himself, so that his distance from the top of either of the pillars shall be equal to the distance between them?

Ans. 91.78 feet from the bottom of the lower.
69.92 feet from the bottom of the other.

25. Three ships are equally distant from an island, the first ship is 30 miles from the second, the second is 25 miles from the third, and the third is 20 miles from the first; required the distance to the isle?

Ans. 15.118579 miles from each.

26. Prove that the elevation of the North or Polar star above the horizon is equal to the latitude of the place where its altitude is taken.

27. I have a board in the form of a triangle; the length of one of its sides is 16 feet. I wish to sell one half of it; at what distance from the larger end must it be divided parallel to the larger end. *Ans.* 4.68 feet.

28. In 2,500 feet running lengths of 7 inches $\times$ 9 inches, how many feet running lengths of $2\frac{1}{2}$ inches $\times$ 11?

Log Rule got up on the Quarter Girt Principle.

Feet Long.	Quarter Girt in Inches.														
	6	6¼	6½	6¾	7	7¼	7½	7¾	8	8¼	8½	8¾	9	9¼	9¾
6	18	19	21	22	24	26	28	30	31	33	36	38	40	42	47
7	21	22	24	26	28	30	32	34	37	39	42	44	47	49	55
8	24	26	28	30	32	34	37	40	42	45	48	50	54	57	63
9	27	29	31	34	36	39	42	45	47	50	54	57	60	64	71
10	30	32	35	38	40	43	46	50	53	56	60	63	67	71	79
11	33	35	38	41	44	48	51	55	58	62	66	70	74	78	86
12	36	39	42	45	48	52	56	60	63	67	72	76	81	85	95
13	39	42	45	49	53	56	60	65	69	73	78	82	87	92	102
14	42	45	49	53	57	61	65	70	74	79	84	89	94	99	110
15	45	49	52	57	61	65	70	75	79	84	90	95	101	107	118
16	48	52	56	60	65	69	74	80	85	90	96	107	108	114	126
17	51	55	59	64	69	74	79	85	90	96	102	108	114	121	134
18	54	58	63	68	73	78	84	90	95	102	108	114	121	128	142
19	57	62	67	72	77	82	88	95	101	107	114	121	128	135	150
20	60	65	70	76	81	87	93	100	106	113	120	127	134	142	158
21	63	68	74	79	85	91	98	105	111	119	126	133	141	149	166
22	66	71	77	83	89	96	102	110	117	124	132	140	148	156	174
23	69	75	81	87	93	100	107	115	122	130	138	146	155	164	182
24	72	78	84	91	97	104	112	120	127	136	144	152	161	171	189
25	75	81	88	95	102	109	117	125	133	141	150	159	168	178	197
26	78	84	91	98	106	113	121	130	138	147	156	165	175	185	205
27	81	88	95	102	110	117	126	135	143	153	162	172	182	192	213
28	84	91	98	106	114	122	130	140	149	158	168	178	188	199	221
29	87	94	102	110	118	126	135	145	154	164	174	184	195	206	229
30	90	97	105	114	122	130	140	150	159	170	180	191	202	214	237
Diameter,	7½	8	8¼	8½	9	9¼	9½	9¾	10¼	10½	10¾	11	11½	11¾	12

In this table the contents are given in feet of board measure. The quarter girts, at the top of the columns, and the corresponding diameters at the bottom, are in inches.

Log Rule got up on the Quarter Girt Principle.— (Continued.)

Feet Long.	Quarter Girt in Inches.																		
	10	10¼	10½	10¾	11	11¼	11½	11¾	12	12¼	12½	12¾	13	13¼	13½	13¾	14	14¼	14½
6	51	52	55	57	60	63	66	69	72	75	78	81	84	88	91	94	97	101	105
7	58	61	64	67	70	73	77	80	84	87	91	94	98	102	106	110	114	118	122
8	66	70	73	77	80	84	88	92	96	100	104	108	112	117	120	126	130	135	140
9	75	78	82	86	90	94	99	103	108	112	117	122	126	131	136	141	146	152	157
10	83	87	92	96	100	105	110	115	120	125	130	135	140	146	151	157	163	169	175
11	91	96	101	105	110	116	121	126	132	137	143	149	154	160	167	173	179	186	192
12	100	105	110	115	121	126	132	138	144	150	156	162	169	175	182	189	195	203	210
13	108	113	119	125	131	136	143	149	156	162	169	176	183	190	197	204	212	220	227
14	116	122	128	134	141	147	154	161	168	175	182	189	197	204	212	220	228	236	245
15	124	131	137	144	151	158	165	172	180	187	195	203	211	219	227	236	244	253	262
16	133	140	147	154	161	168	176	184	192	200	208	216	225	234	242	252	261	270	280
17	141	149	156	163	171	177	187	195	204	212	221	230	239	248	258	267	277	287	298
18	149	157	165	173	181	189	198	207	216	225	234	243	253	263	273	283	293	304	315
19	158	166	174	183	191	200	209	218	228	238	247	257	267	278	283	299	310	321	333
20	166	175	183	192	201	210	220	230	240	251	260	270	281	292	303	315	326	338	350
21	174	184	193	130	211	221	231	241	252	264	273	284	295	307	318	330	342	355	368
22	183	192	202	212	222	231	242	253	264	276	286	298	310	321	334	346	359	372	385
23	191	201	211	221	232	242	253	264	276	289	297	311	324	336	349	362	375	389	403
24	200	210	220	231	243	253	264	276	288	301	312	325	338	351	364	378	392	406	420
25	208	219	229	240	252	263	275	283	300	314	325	338	352	365	379	394	408	423	438
26	216	227	238	250	262	274	286	299	312	326	338	352	366	380	394	409	424	440	455
27	224	236	248	260	272	284	297	300	324	339	351	365	380	395	409	425	441	456	473
28	233	243	257	270	282	295	308	322	336	352	364	379	394	409	425	441	457	473	490
29	241	254	266	279	292	305	319	333	348	362	377	392	408	424	440	457	473	490	508
30	249	263	275	289	302	316	330	345	360	375	390	406	422	438	455	472	490	507	525
Diameters.	12½	12¾	13	13¼	13¾	14	14¼	14½	15	15¼	15½	16	16½	16¾	17¼	17½	17¾	18	18½

Log Rule got up on the Quarter Girt Principle.— (Continued.)

Feet Long.	Quarter Girt in Inches.																	
	14¾	15	15¼	15½	15¾	16	16¼	16½	16¾	17	17¼	17½	17¾	18	18½	19	19½	20
6	108	112	116	120	123	127	131	136	140	144	148	153	157	162	171	180	190	200
7	127	131	135	140	144	149	154	158	163	168	173	178	183	189	199	210	219	233
8	145	150	155	160	165	170	175	181	187	192	198	204	209	216	228	240	253	266
9	163	168	174	180	185	191	197	204	210	216	223	229	236	243	256	270	286	300
10	181	187	193	200	206	213	219	226	233	240	247	255	262	270	285	300	317	333
11	199	206	213	220	227	234	242	249	257	264	272	280	288	297	313	330	348	366
12	217	224	232	240	247	255	263	272	280	288	297	306	315	324	342	360	380	399
13	235	243	251	260	268	277	285	294	303	313	322	331	341	351	370	390	411	433
14	254	262	271	280	289	298	307	317	327	337	347	357	367	378	399	421	443	466
15	272	281	290	300	310	319	330	340	350	361	371	382	393	405	427	451	475	499
16	290	300	310	320	330	341	351	362	374	385	396	408	420	432	456	481	506	533
17	308	318	329	340	351	362	374	385	397	409	421	433	446	459	484	511	538	566
18	326	337	348	360	372	383	396	408	420	433	446	459	472	486	513	541	570	599
19	344	356	367	380	392	405	418	431	444	457	471	484	498	513	541	571	602	633
20	362	374	387	400	413	426	440	453	467	481	495	510	524	540	570	601	633	666
21	380	393	407	420	433	447	461	476	490	505	520	535	551	567	598	631	655	699
22	399	412	426	440	454	469	484	499	514	529	545	561	577	594	627	661	697	733
23	417	431	445	460	475	490	506	521	537	553	570	586	603	621	656	691	728	766
24	435	449	465	480	495	510	528	544	561	577	595	612	629	648	684	721	760	799
25	453	468	484	500	516	533	550	567	584	601	619	637	656	675	712	751	792	833
26	471	487	503	520	537	554	571	589	607	625	644	663	682	702	741	781	823	866
27	489	506	523	540	557	575	593	612	631	650	669	688	708	729	769	811	855	899
28	507	524	542	560	578	597	615	635	654	674	694	714	734	756	798	842	887	933
29	525	543	562	580	599	618	637	657	677	698	718	739	761	783	826	872	918	966
30	543	562	581	600	620	639	659	680	701	722	743	756	787	810	855	902	950	999
Diameters.	18¾	19	19¼	19¾	20	20¼	20¾	21	21¼	21½	22	22¼	22½	23¼	23½	24¼	24¾	25½

Log Rule got up on the Quarter Girt Principle. — (Continued.)

Feet Long.	Quarter Girt in Inches.																		
	20½	21	21½	22	22½	23	23½	24	24½	25	25½	26	26½	27	27½	28	28½	29	30
6	210	220	231	242	253	264	276	288	300	312	325	338	341	364	378	392	406	420	450
7	245	257	269	282	295	308	322	336	350	364	379	394	409	425	441	456	473	490	525
8	280	293	308	322	337	352	368	384	400	416	433	450	468	486	504	522	541	560	600
9	315	330	346	363	379	396	414	432	450	468	487	507	526	546	567	588	609	630	675
10	350	367	385	403	422	440	460	480	500	520	541	563	585	607	630	653	676	710	750
11	385	404	423	443	464	484	506	528	550	572	596	619	643	668	693	718	744	770	825
12	420	440	462	484	506	528	552	576	600	625	650	676	702	729	756	784	812	841	900
13	455	477	500	524	548	572	598	624	650	677	704	732	760	789	813	849	879	911	975
14	490	514	537	564	590	617	644	672	700	729	758	788	819	850	882	914	947	981	1050
15	525	551	577	605	632	661	690	720	750	781	812	845	877	911	945	980	1015	1051	1125
16	560	588	616	645	675	705	736	768	800	833	867	901	936	971	1008	1045	1082	1121	1200
17	595	624	654	685	717	749	782	816	850	885	921	957	994	1032	1071	1109	1150	1191	1275
18	630	661	693	726	759	793	828	864	900	937	975	1014	1053	1093	1134	1175	1218	1261	1350
19	665	698	731	766	801	837	874	912	950	989	1029	1070	1111	1154	1197	1241	1286	1331	1425
20	700	734	770	806	843	881	920	960	1000	1041	1083	1126	1170	1214	1260	1306	1353	1401	1500
21	735	771	808	847	886	925	966	1008	1050	1093	1138	1182	1228	1275	1323	1371	1421	1471	1575
22	770	808	847	887	928	969	1012	1056	1100	1145	1192	1239	1287	1336	1386	1437	1489	1541	1650
23	805	845	885	928	970	1003	1058	1104	1150	1197	1246	1295	1345	1397	1449	1502	1556	1611	1725
24	840	881	924	968	1012	1057	1104	1152	1200	1249	1300	1351	1404	1457	1512	1567	1624	1681	1800
25	875	918	962	1008	1054	1102	1150	1200	1250	1302	1354	1408	1462	1518	1575	1633	1692	1752	1875
26	910	955	1001	1049	1097	1146	1196	1248	1300	1354	1409	1464	1521	1579	1638	1698	1759	1822	1950
27	945	992	1039	1089	1139	1190	1242	1296	1350	1406	1463	1520	1579	1640	1701	1758	1827	1892	2025
28	980	1028	1078	1129	1181	1234	1288	1344	1400	1458	1517	1577	1638	1700	1764	1829	1895	1962	2100
29	1015	1065	1104	1170	1223	1278	1334	1392	1450	1510	1571	1633	1696	1761	1827	1894	1962	2032	2175
30	1050	1102	1155	1210	1265	1322	1380	1440	1500	1562	1625	1689	1755	1822	1890	1959	2030	2102	2250
Diameters.	26	26¾	27¼	28	28½	29¼	29¾	30½	31	31½	32½	33	33¾	34¼	35	35½	36¼	36¾	38

Log Rule got up on the Quarter Girt Principle. — (Continued.)

Feet Long.	Quarter Girt in Inches.																		
	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
6	480	512	544	578	612	648	684	722	760	800	840	882	924	968	1012	1058	1104	1152	1200
7	560	597	635	674	714	760	798	842	887	933	962	1020	1077	1129	1181	1234	1288	1344	1400
8	640	682	726	770	816	878	912	963	1014	1066	1120	1176	1233	1290	1350	1410	1472	1536	1600
9	720	768	816	866	918	992	1026	1083	1140	1200	1260	1323	1386	1452	1518	1587	1656	1728	1800
10	800	854	907	962	1020	1080	1140	1203	1267	1333	1400	1470	1539	1613	1687	1763	1841	1920	2000
11	880	940	998	1058	1122	1188	1256	1323	1394	1466	1540	1617	1693	1774	1856	1939	2024	2112	2200
12	960	1026	1089	1154	1224	1296	1369	1440	1521	1600	1681	1764	1849	1936	2025	2116	2209	2304	2401
13	1040	1109	1180	1250	1326	1404	1483	1564	1647	1733	1821	1911	2003	2097	2193	2292	2393	2496	2601
14	1120	1192	1271	1346	1428	1512	1597	1684	1766	1865	1961	2058	2197	2258	2361	2469	2577	2688	2801
15	1200	1275	1362	1445	1530	1620	1711	1805	1896	2000	2101	2205	2311	2420	2531	2465	2761	2880	3001
16	1280	1363	1453	1541	1632	1728	1825	1925	2028	2133	2241	2352	2467	2581	2700	2821	2945	3072	3201
17	1360	1450	1544	1637	1734	1836	1939	2037	2154	2266	2381	2499	2619	2742	2877	2997	3129	3264	3401
18	1441	1536	1633	1733	1836	1944	2045	2166	2281	2400	2521	2646	2773	2904	3037	3190	3313	3456	3601
19	1522	1621	1724	1829	1938	2052	2167	2286	2408	2533	2661	2793	2927	3065	3206	3340	3497	3648	3801
20	1603	1706	1815	1925	2040	2160	2281	2405	2535	2666	2802	2940	3081	3226	3375	3526	3681	3840	4001
21	1684	1792	1906	2021	2143	2268	2395	2527	2711	2800	2946	3087	3235	3388	3543	3702	3915	4032	4201
22	1765	1877	1997	2117	2245	2376	2509	2645	2788	2933	3081	3234	3389	3549	3712	3879	4049	4224	4401
23	1841	1962	2088	2213	2347	2484	2623	2767	2906	3066	3221	3381	3543	3710	3881	4055	4233	4416	4601
24	1922	2048	2189	2309	2445	2592	2738	2888	3042	3200	3362	3528	3698	4035	4050	4231	4418	4608	4802
25	2002	2133	2280	2405	2547	2700	2852	3008	3168	3333	3503	3675	3852	4197	5290	4409	4602	4800	5002
26	2083	2218	2371	2501	2649	2808	2966	3128	3295	3466	3642	3822	4005	4356	4387	4584	4785	4992	5202
27	2164	2304	2462	2597	2751	2916	3080	3240	3422	3600	3782	3969	4160	4376	4556	4761	4970	5184	5402
28	2245	2389	2553	2693	2853	3024	3194	3369	3549	3733	3922	4116	4314	4517	4725	4937	5154	5376	5602
29	2326	2474	2644	2789	2955	3132	3309	3489	3675	3866	4062	4266	4468	4670	4893	5113	5338	5568	5802
30	2407	2560	2735	2885	3057	3240	3422	3610	3796	4000	4202	4410	4622	4840	5062	5289	5550	5760	6002
Diameters.	$39\frac{1}{2}$	$40\frac{3}{4}$	42	$43\frac{1}{4}$	$44\frac{1}{2}$	$45\frac{3}{4}$	47	$48\frac{1}{4}$	$49\frac{1}{2}$	$50\frac{3}{4}$	$52\frac{1}{4}$	$53\frac{1}{2}$	$53\frac{3}{4}$	56	$57\frac{1}{4}$	$58\frac{1}{2}$	$62\frac{1}{2}$	61	$62\frac{1}{4}$

How to use the Log or Timber Rule.

If the timber is tapering, the girt should be taken about one third the distance from the larger to the smaller end. Some take the girt in the middle. Girt the log to be measured, and take the quarter of it, and measure the length of the log. Then look along the top of the table till you come to the corresponding quarter girt; then run down the column underneath the quarter girt till you get opposite the length, where you will find the contents. Or, you can find the contents by taking the diameter of the small end and the length. Then find the corresponding diameter at the foot of the table, and ascend the line perpendicularly till you come opposite the length, where you will find the contents.

P. S. — This table allows one fourth of the true contents of the log for bark, saw kerf, and waste slab. It has been extensively used by timber merchants, and is just about as fair a rule to go by as any I have seen. There are many allowances to be made which are left to the scaler's judgment, and for which it would be almost impossible to make due allowance in the table.

INTEREST.

Rule for finding the interest at 6 *per cent.* — Multiply the sum by the number of days, divide the product by 6, then strike off the right-hand figure.

EXAMPLE.

$200
12 days.

6)2400

400 = 40 cents is the interest.

INTEREST TABLE, FOR THIRTY DAYS, AT SIX PER CENT. PER ANNUM.

(From One Dollar to One Thousand Dollars, and from One Day to Thirty Days, and to Three Months, and from One Year to Six Years. Calculated correctly.)

Days..	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DOLLS.	c.	c.	c.	c.	c.	c.	c.	c.	c.	c.	c	c.	c.	c.	c.	c.	c.	c.	c.	c.	c.	c.	c.
$																							
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
3	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
5	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
6	0	0	0	0	0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
7	0	0	0	0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	3
8	0	0	0	0	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	3
9	0	0	0	0	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	3	4
10	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4
20	0	0	1	1	1	1	2	2	2	2	2	2	2	3	3	5	5	6	6	6	7	7	8
30	0	1	1	2	2	2	2	3	3	3	4	4	4	5	5	7	8	8	9	10	10	11	11
40	1	1	2	2	3	3	3	4	4	4	5	5	6	6	7	9	10	11	12	13	14	14	15
50	1	2	2	3	4	4	4	5	5	5	6	7	8	8	9	11	12	13	14	16	17	18	19
60	1	2	3	3	4	5	5	6	6	6	7	8	9	10	11	13	14	16	17	19	20	21	23
70	1	2	3	4	5	6	6	7	7	7	8	9	10	11	12	15	16	18	19	22	23	25	26
80	1	3	3	4	5	6	7	8	8	8	9	10	11	12	13	17	18	20	22	25	26	28	30
90	1	3	4	5	6	7	8	9	9	9	10	11	12	13	14	19	20	23	24	28	29	31	34
100	2	3	5	6	7	8	10	11	11	11	12	13	14	15	16	21	23	25	27	31	33	35	38
200	3	7	10	13	16	20	23	25	27	28	30	33	35	37	39	43	46	50	53	58	61	63	68
300	5	10	15	20	25	30	35	38	41	42	45	49	53	56	59	64	69	74	79	86	89	94	99
400	7	13	21	26	33	40	46	51	54	56	60	66	70	74	78	85	92	99	1.05	1.12	1.18	1.25	1.32
500	8	16	25	33	41	49	55	63	68	70	75	82	88	93	98	1.07	1.15	1.23	1.32	1.40	1.48	1.56	1.64
1000	16	33	49	66	82	99	1.15	1.32	1.48	1.64	1.81	1.97	2.14	2.30	2.47	2.63	2.79	2.96	3.12	3.29	3.45	3.62	3.78

First Example at 6 per cent. — Required, 50 days interest on $100.

Interest on $100 for 30 days = 49 cents.

Interest on $100 for 20 days = 33 "

Ans. 82 cents.

INTEREST TABLE — *Continued.*

Days..	24	25	26	27	28	29	30	1 Mo.	2 Mo.	3 Mo.	1 Yr.	2 Yr.	3 Yr.	4 Yr.	5 Yr.	6 Yr.
DOLLS.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.	¢ c.
$ 1	0	0	0	0	0	0	0	1	1	2	6	12	18	24	30	36
2	1	1	1	1	1	1	1	1	2	3	12	24	36	48	60	72
3	1	1	1	1	1	1	1	1	3	4	18	36	54	72	90	1.08
4	2	2	2	2	2	2	2	2	4	6	24	48	72	96	1.20	1.44
5	2	2	2	2	2	2	2	2	5	7	30	60	90	1.20	1.50	1.80
6	2	2	3	3	3	3	3	3	6	9	36	72	1.08	1.44	1.80	2.16
7	3	3	3	3	3	3	3	3	7	10	42	.84	1.26	1.68	2.10	2.52
8	3	3	3	4	4	4	4	4	8	12	48	96	1.44	1.92	2.40	2.88
9	4	4	4	4	4	4	4	4	9	13	54	1.08	1.62	2.16	2.70	3.24
10	4	4	4	4	5	5	5	5	10	15	60	1.20	1.80	2.40	3.00	3.60
20	8	8	9	9	9	10	10	10	20	30	1.20	2.40	3.60	4.80	6.00	7.20
30	12	12	13	13	14	14	15	15	30	45	1.80	3.60	5.40	7.20	9.00	10.80
40	16	16	17	18	18	19	20	20	40	60	2.40	4.80	7.20	9.60	12.00	14.40
50	20	21	21	22	23	24	25	25	50	75	3.00	6.00	9.00	12.00	15.00	18.00
60	24	25	26	27	28	29	30	30	60	90	3.60	7.20	10.80	14.40	18.00	21.60
70	28	29	30	31	32	33	35	35	70	1.05	4.20	8.40	12.60	16.80	21.00	25.20
80	32	33	34	36	37	38	39	40	80	1.20	4.80	9.60	14.40	19.20	24.00	28.80
90	36	37	38	40	41	43	44	45	90	1.35	5.40	10.80	16.20	21.60	27.00	32.40
100	39	41	43	44	46	48	49	50	1.00	1.50	6.00	12.00	18.00	24.00	30.00	36.00
200	79	82	85	89	92	95	99	1.00	2.00	3.00	12.00	24.00	36.00	48.00	60.00	72.00
300	1.18	1.23	1.28	1.33	1.38	1.43	1.48	1.50	3.00	4.50	18.00	36.00	54.00	72.00	90.00	108.00
400	1.58	1.64	1.71	1.78	1.84	1.91	1.97	2.00	4.00	6.00	24.00	48.00	72.00	96.00	120.00	144.00
500	1.97	2.05	2.14	2.22	2.30	2.38	2.47	2.50	5.00	7.50	30.00	60.00	90.00	120.00	150.00	180.00
$1000	3.95	4.11	4.27	4.44	4.60	4.77	4.93	5.00	10.00	15.00	60.00	120.00	180.00	240.00	300.00	360.00

Rule for computing interest at any rate per cent. by the above table. — Find the interest by the table of the given sum for the time given. Divide the interest found by 6, and multiply the quotient by the given rate per cent., and the result will be the required interest. EXAMPLE. — Required, the interest of $1000 for 1 year, at 8 per cent.

Interest of $1000 for 1 year, by the table = $60.

$60 ÷ 6 = $10. $10 × 8 = $80, the interest of $1000 at 8 per cent. for one year = *Ans.*

Second Example at 6 per cent. — Required, the interest of $50 for 3 years, 2 months, and 10 days.

Interest on $50 for 3 years	= $9.00
Interest on $50 for 2 mos.	= 50
Interest on $50 for 10 days	= 8
Ans.	$9.58

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